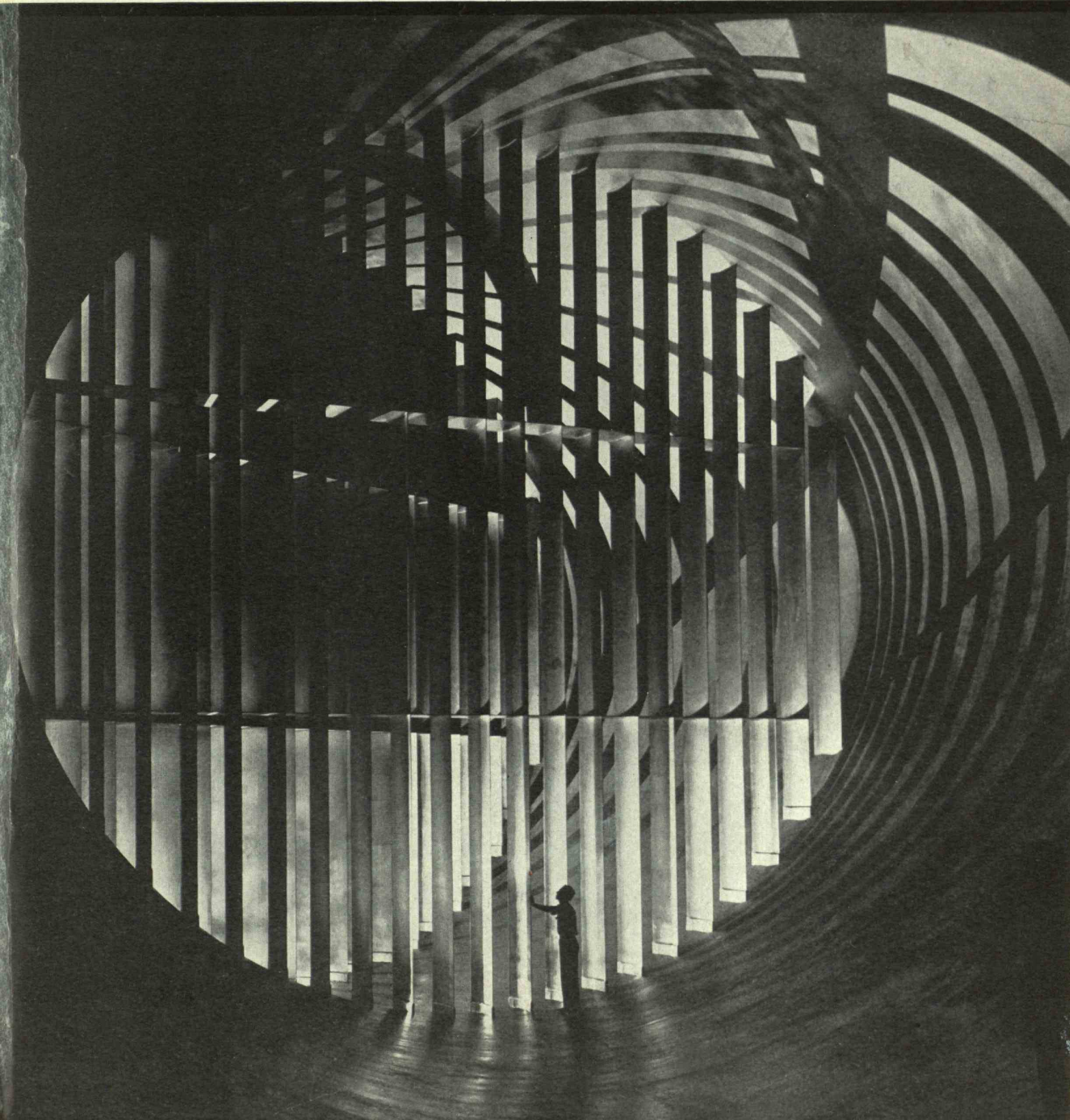


January 1947

TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office

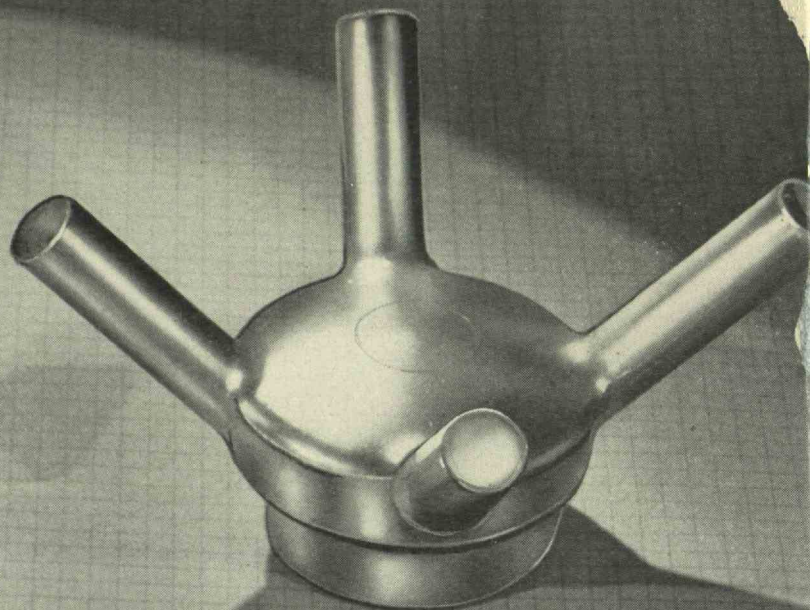
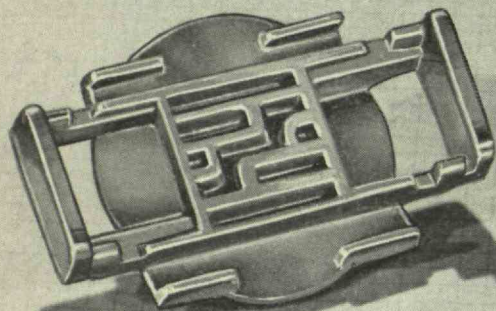


technology review

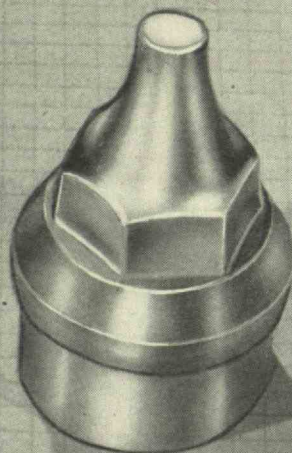
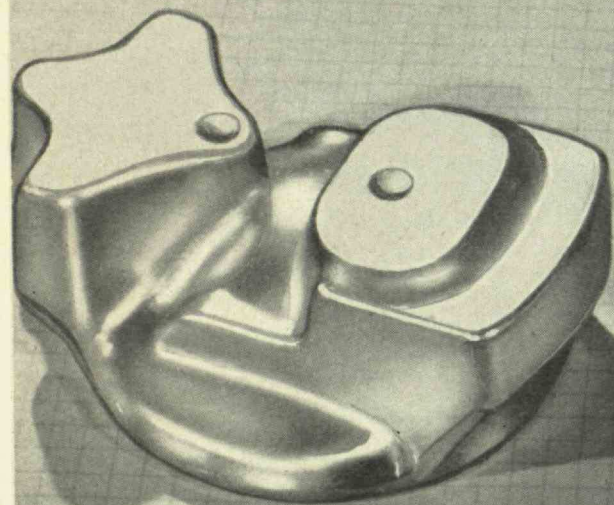
Published by MIT

This PDF is for your personal, non-commercial use only.
Distribution and use of this material are governed by copyright law.
For non-personal use, or to order multiple copies please email
permissions@technologyreview.com.

IMPROVE QUALITY.. LOWER COSTS.. *USE FORGINGS!*



UNLIMITED APPLICATIONS



THE **HARVEY**

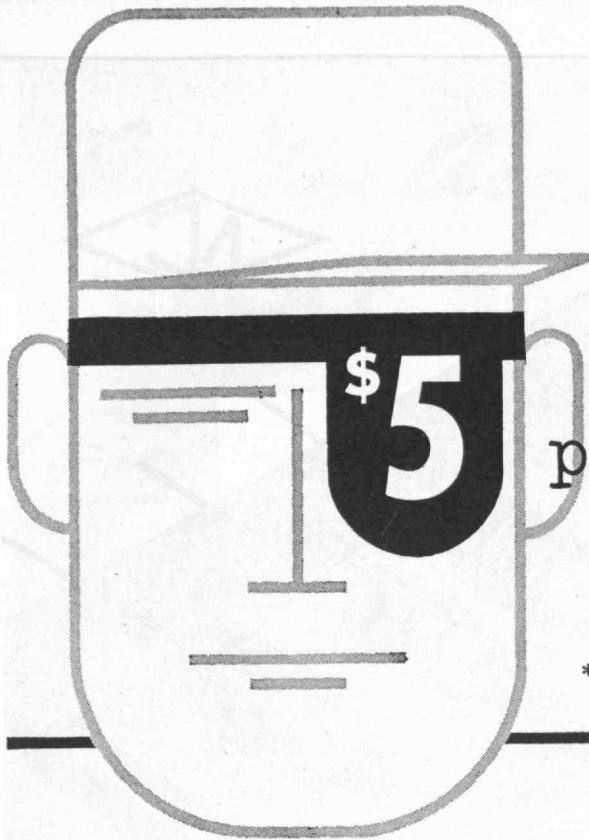
METAL CORPORATION

HAROLD B. HARVEY '05 • *Engineers & Manufacturers* • SHERRY O'BRIEN '17

74th STREET and ASHLAND AVENUE • CHICAGO 36, ILLINOIS

FORGINGS IN ALUMINUM • BRASS • BRONZE • COPPER • MAGNESIUM • MONEL • ALLOYS

MACHINING FACILITIES



Eye Accidents

Cost Industry

per shop worker

per Year*...

*(Society for the Prevention of Blindness)

98% of all

Eye Accidents are Preventable

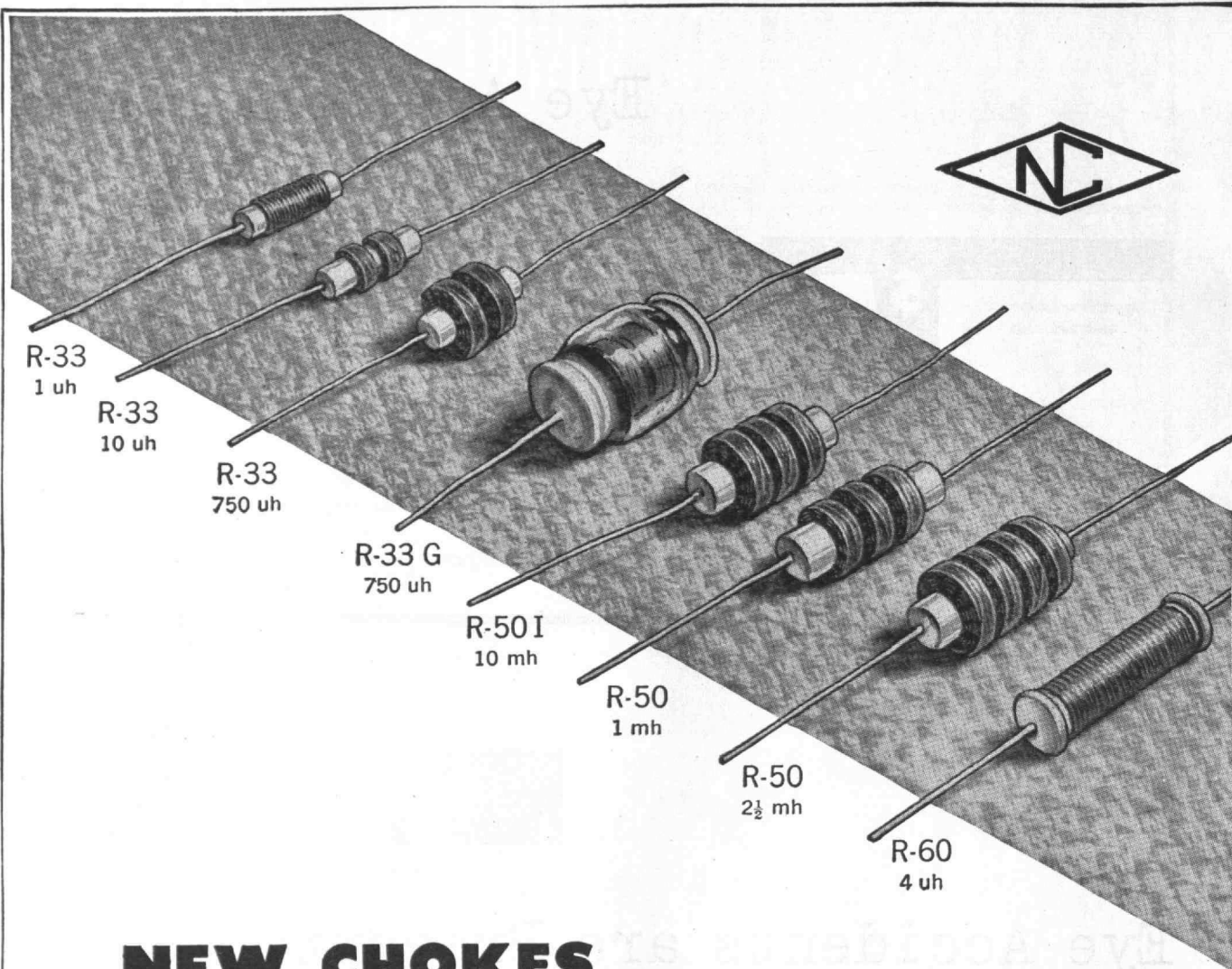
by Wearing Goggles*



Send to your nearest A-O Safety Representative or direct to American Optical Company, Box T, for a copy of the new booklet, "Eye Accident Costs," which tells how much eye accidents cost, how to prevent them and how much you can save by preventing them.

American  Optical
COMPANY
Safety Division

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES



NEW CHOKES

The enlarged line of chokes now offered by National includes many new sizes and types and provides units suited to specialized as well as standard applications. Many popular new chokes are illustrated above, including the R-33G which is hermetically sealed in glass. Other models cover current ratings from 33 to 800 milliamperes in a variety of mountings carefully planned for your convenience. These as well as old favorites like the R-100 are listed in the latest National Catalogue.

NATIONAL COMPANY, INC., MALDEN, MASS.



Are You Acquainted with the **WHOLE Norton Family?**

ABRASIVE PRODUCTS

Grinding wheels ranging from tiny internals $3/16 \times 3/16$ " to the 72" diameter segmental type — wheels of Alundum[®], Crystolon[®] and diamond abrasives, of many different bonds; a wide variety of abrasive bricks, sticks, hones and segments; mounted points and mounted wheels in nearly 200 sizes and shapes; abrasive grain for polishing, lapping and tumbling.

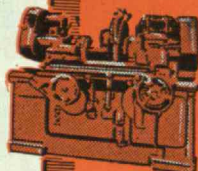
NORBIDE[®]

"The hardest material made by man for commercial use" — that is NORBIDE, the trade name for Norton Boron Carbide. It is serving industry in three forms: (1) Norbide Abrasive for grinding and lapping carbide tools, and for lapidary work; (2) Norbide Molded Shapes for pressure blast nozzles and for plug, ring and other types of gages; (3) Norbide Metallurgical Compound for improving the hardness and cutting ability of tool steels and as a deoxidizing agent.



GRINDING AND LAPPING MACHINES

Norton cylindrical grinders range from the neat, compact 4 x 12" Type C to the gigantic 36 x 816" Type D and include special types for grinding crankshafts, camshafts, rolls and car wheels. Norton surface grinders are available in three sizes, 6", 10" and 12". There are three Norton Tool and Cutter Grinders and the Norton Buraway. Lapping Machines range from the small 10-U to the large Hyprolap[®] for flat and cylindrical work, and include special machines for crankshafts and camshafts.



PULPSTONES

Norton ingenuity developed for the pulp and paper industry a line of segmental stones running as large as 72 x 54" and weighing up to ten tons — stones that convert the logs of the forest into wood pulp for newspaper, wall paper, towels, toilet tissue, cartons, wall board, paper plates and countless other uses.



NORTON FLOORS

The hardness, toughness and abrasive properties of Alundum abrasive are made use of in NORTON FLOORS — Alundum Stair and Floor Tile, Alundum Ceramic Mosaic Tile and Alundum Aggregate for terrazzo and cement floors. They are for use in public and commercial buildings wherever it is necessary to provide floors and stairs with an extremely wear-resisting and permanently non-slip surface (wet or dry).



POROUS MEDIUMS

Norton Porous Mediums are made in a wide variety of shapes and rates of permeability for the aeration, filtration and diffusion of liquids, solids and gases. Important uses are in activated sludge sewage disposal plants, for municipal water filtration plants and in many commercial filtration and aeration processes.



REFRACTORIES

The terrific heat of the electric furnaces which produce Alundum and Crystolon abrasives also gives these materials valuable refractory properties — properties which are made use of in a complete line of Norton refractory grain, cements, bricks, plates, tiles and other shapes for metal melting and heat treating, for enameling furnaces, ceramic kilns, boiler furnaces, gas generators; also refractory laboratory ware for ignition, incineration and filtration.



OILSTONES AND COATED ABRASIVES

Oilstones and sharpening specialties in sizes and shapes to meet every need of the industrial worker, the farmer and the home craftsman; and abrasive paper and cloth in a wide variety of coatings and types for both industry and the home mechanic are available through the Behr-Manning Corporation of Troy, New York, Division of Norton Company.



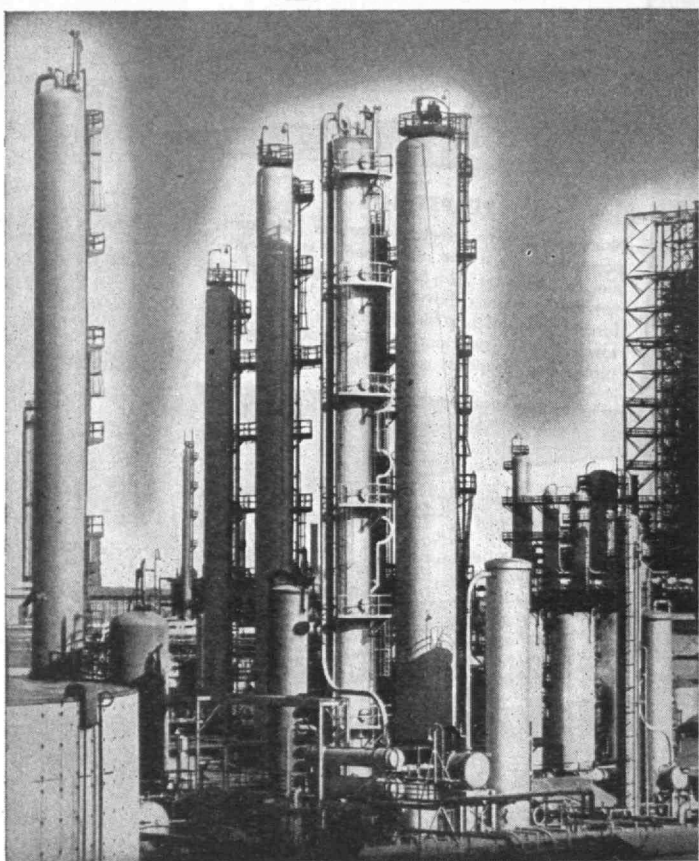
Informative literature in any or all of these Norton products available on request — also Norton engineering service. Write today.

* Trade-marks registered U. S. Patent Office

**NORTON COMPANY
WORCESTER 6, MASS.**

NORTON

6 IN A ROW...



6 THERMAL "CRACKERS"... INITIAL RUNS OF MORE THAN 30 DAYS!

A long initial run is the forerunner of satisfactory performance in the long run. An engineering and construction organization whose projects are characterized by long initial runs is, therefore, a good one to build or modernize your refining facilities.

Among the long initial runs which have characterized Lummus construction are those of six thermal cracking units. In chronological order, the initial runs on these units were 33, 35, 39, 49, 65 and 69 days. In each instance the plant was shut down for inspection purposes only.

The latest Lummus catalytic cracking plant ran 240 days on its initial start-up before it was shut down for inspection.

A reputation for long initial runs is only one index by which to judge Lummus engineering and construction. Other indices are: *experience* — Lummus has built over 600 plants throughout the world; *process development* — Lummus pioneered the commercial development of a number of processes now standard; *research and development facilities* — Lummus has complete laboratory and pilot plants for refinery development, plus broad experience required to prepare economic studies of proposed installations.

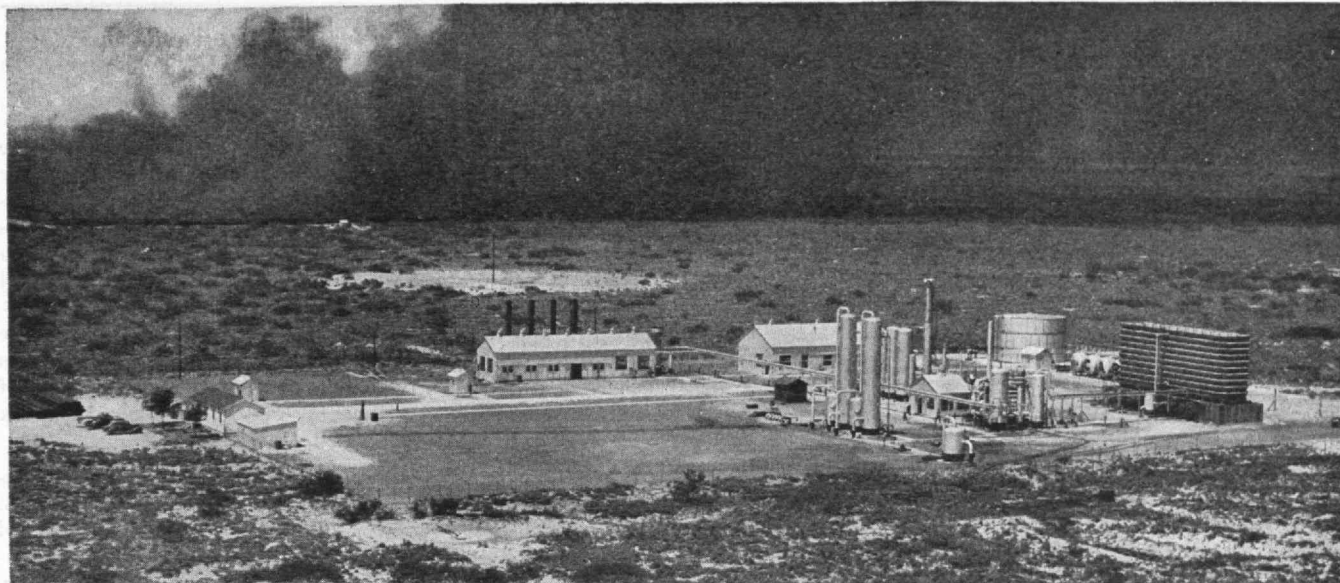
Lummus engineers are available for a discussion of the technological and economic considerations of refinery modernization or new plant construction.

THE LUMMUS COMPANY

420 Lexington Avenue, New York 17, N. Y.

LUMMUS Petroleum Processes and Plants
CHICAGO — 600 South Michigan Avenue, Chicago 5, Ill.
HOUSTON — Mellie Esperson Bldg., Houston 2, Texas
LONDON — 78 Mount Street, London, W. 1, England

Lummus
PETROLEUM REFINING PLANTS



FOR INDUSTRY

Carbon Black
Natural Gas
Natural Gasoline
Pumping Equipment
Pine Tar
Charcoal
Carotene
Chlorophyll



And for conservation too, as these two consecutive Cabot operations in the West Texas oil fields demonstrate. These plants are treating casinghead gas, the "sour" gas whose sulphur content destroys its ordinary industrial value. It is the waste gas which once was blown off in the air or burnt at the wells as a dangerous nuisance.

The Cabot Carbon Company puts this same gas to further valuable uses. First, Cabot plants like Keystone, shown above, strip it of its natural gasoline for the enrichment of distilled motor fuels. Propane and butane also are extracted.

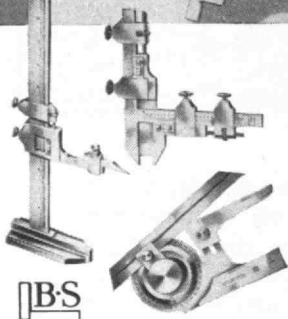
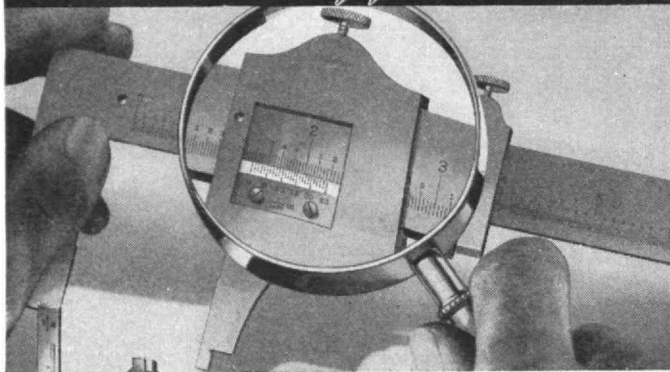
Next, this same gas is burnt at plants like Cabot's Kermit, in the background, in the manufacture of carbon black for rubber, paint, varnish, lacquer and ink. Yet carbon black, natural gasoline, butane and propane are only four of the raw materials which the group of Cabot Companies provides for industry.

CABOT CARBON CO.
TEXAS ELF CARBON CO.
GENERAL ATLAS CARBON CO.
CABOT SHOPS, INC.
VALLEY VITAMINS, INC.

GODFREY L. CABOT, INC.

77 FRANKLIN STREET • BOSTON 10, MASS.

FINE, CLEAN-CUT LINES ... a mark of fine tools



Brown & Sharpe has always put into fine machinists' tools the largest possible measure of good workmanship, fine materials, and sound design. For example, the machine-divided graduations on Brown & Sharpe Vernier Tools.

Brown & Sharpe machinists' tools give every purchaser a generous return on a sound investment. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the distributor.

BROWN & SHARPE TOOLS

RENEWING A RESOLUTION

At the beginning of 1947, Diefendorf renews its resolution: that high standards and strict inspections will be maintained at all times; that every gearing problem will be given the engineering skill that comes of long experience.

Diefendorf Gear Corp.
D. W. Diefendorf '30, President
Syracuse 1, New York



diefendorf
★★★★★ **GEARS**

THE TABULAR VIEW

American Sidewheelers. — H. E. Lobdell, '17, Executive Vice-president of the Alumni Association and publisher of the *Technology Review* (whose biography appears in greater detail on pages 104-105 of the December issue) brings to this issue a product of his hobby of stamp collecting. Based on a study of the postal history of foreign ports in China and Japan, *Orient Mails "Via Pacific"* (page 151) deals with significant matters of trade and technology in opening the Orient to American commerce and mail some eight decades back. A definitive article, emphasizing the postal aspects of the same study, has appeared by Mr. Lobdell in the yearbook of the Twelfth American Philatelic Congress.

Antibiotic Metabolites. — As sequel to his article on penicillin in the March 1944 issue of *The Review*, Dr. Rudolf E. Gruber, '16, discusses recent advances in the production and use of penicillin and streptomycin (page 155). From his vantage point as Vice-president of Merck and Company, Dr. Gruber speaks with authority of intimate knowledge of these two war-developed therapeutics, whose beneficial results have attracted widespread comment.

Dust Removal. — Well known to *Review* readers as a Swiss-trained engineer, Dr. Sigfried Giedion has returned to Zurich after spending several years in the United States carrying on research for his new book — soon to bear the imprint of Oxford University Press — in which he surveys the impact of mechanization on the culture of our times. *Vacuum in the Home* (page 157) is excerpted from the section dealing with origins, premises and trends of mechanization in the household, with the permission of the publisher and the co-operation of Dr. Giedion's American representative, James Martin.

Absolute Zero. — Having taught physics and chemistry at several universities — including M.I.T. where he joined the department of chemistry in 1930 — S. C. Collins is now associate professor of mechanical engineering and deeply engrossed in low temperature research. Recent research which Dr. Collins records (page 161) opens up new industrial operations by making available large quantities of oxygen at low cost. The greatest significance of his work, however, is undoubtedly the new knowledge of the behavior of matter which will come to light with the creation of new techniques for working at temperatures near absolute zero.

Speed with Economy

**We are now working on
our 38th contract for
CHARLES PFIZER & CO., INC.**

whom we have had the pleasure
of serving since 1927

W. J. BARNEY CORPORATION
101 PARK AVENUE, NEW YORK
INDUSTRIAL CONSTRUCTION
Alfred T. Glassett '20, Vice President

HANNIBAL'S FROZEN ASSET

The Romans smugly thought the icy barrier of the Alps impassable. But Hannibal turned the paralyzing cold to his advantage. He had water poured into the crevices of road-blocking boulders. The expansion of the freezing water "made little ones out of big ones"—and another road led to Rome. Low temperature, which worked to Hannibal's advantage, is a distinct disadvantage to operating machinery. Under low temperature conditions, some steels that may perform

perfectly at ordinary temperatures, develop unsuspected weakness. There is always danger of a parts failure under such conditions.

One way to assure good performance at low temperatures is to specify molybdenum steels. Good hardenability plus freedom from temper brittleness give them good low temperature impact strength. They are a precaution it pays not to ignore. Practical working data are available on request.

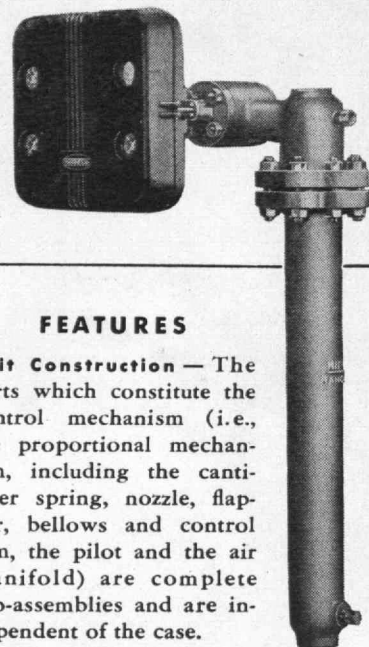
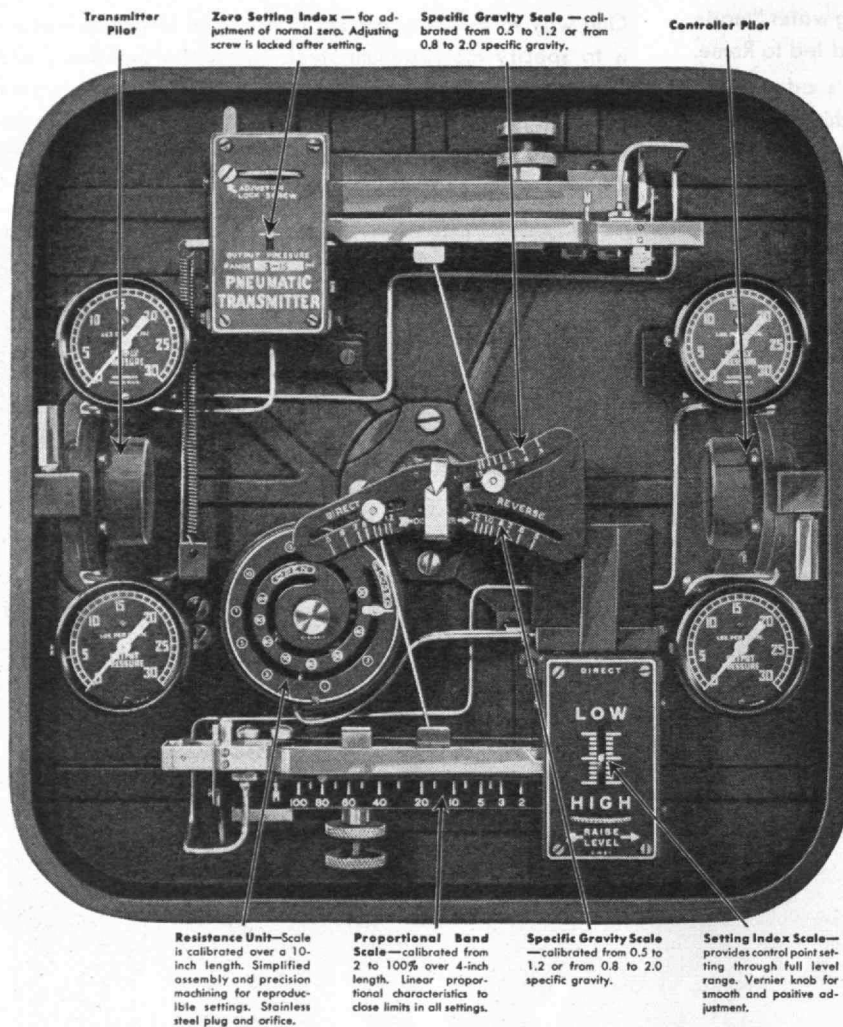


MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"
CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

Climax Molybdenum Company
500 Fifth Avenue • New York City

Remote Pneumatic Level Indication

WITH 12000 SERIES LEVEL CONTROLLERS



FEATURES

Unit Construction — The parts which constitute the control mechanism (i.e., the proportional mechanism, including the cantilever spring, nozzle, flap, bellows and control arm, the pilot and the air manifold) are complete sub-assemblies and are independent of the case.

Pilot — The large capacity pilot is fastened directly to the air manifold by means of two screws, eliminating any major air tubing connections and facilitating removal. Simplified construction permits disassembly in the field for cleaning.

Air Passages — All air passages are bronze or copper, preventing the formation of scale or rust beyond the air filter in the supply line.

Knife-Edge and Flexure Bearings — The lost motion and friction is reduced to such a point by the use of knife-edge and flexure bearings that the response to changes in level is practically instantaneous.

Torque Tube Sub-Assembly — All parts of the torque tube sub-assembly are of inconel and are fused together by the atomic-hydrogen arc welding process. Monel and stainless steel assemblies also available.

The 12600-20 Series of Level Controller-Transmitters have been developed in order to provide level indication or recording in addition to the primary function of controlling level. The Controller-Transmitter provides increased flexibility to meet process requirements.

CONTROLLER MECHANISM — available with either proportional (12600-20) or proportional-reset (12610-20) action. All features of the basic controller have been retained, e.g. the easily calibrated specific gravity scale, the proportional mechanism, the large capacity balanced pilot, the vernier control point setting, the reversible control action.

TRANSMITTER MECHANISM — operates from the same measuring element, that is, from the same displacer and torque tube assembly. Otherwise, it is completely independent from the controller mechanism. Separate supply and output gauges have been provided to simplify operation and servicing.



MASON-NEILAN REGULATOR COMPANY
1190 Adams Street, Boston 24, Mass., U.S.A.

New York • Buffalo • Chicago • St. Louis • Philadelphia • Houston • Pittsburgh • Cleveland • Tulsa • Atlanta • Los Angeles • San Francisco
Mason Regulator Co. of Canada, Ltd., Montreal and Toronto

"Our knowledge is the amassed thought and experience of innumerable minds"

—RALPH WALDO EMERSON



Why some things get better all the time

THE OLD-FASHIONED STOVE has warmed many a generation through the years. But today families are kept healthfully warm by far more effective means.

There are electric heaters and electric blankets with their efficient alloy heating elements. Individual gas fuel installations. Improved heating systems for our homes, ranging from oil burners with fuel nozzles of long-lasting synthetic sapphire to the new panel heating with its welded piping. Also giving you finer service are better insulated electrical wiring, vast central heating systems, and city and cross-country gas lines.

Far-reaching are the improvements in heating and power enjoyed by families today . . . And most of these improvements are possible because of *better materials*.

Producing better materials for the use of industry and the benefit of mankind is the work of UNION CARBIDE.

Basic knowledge and persistent research are required, particularly in the fields of science and engineering. Working with extremes of heat and cold—frequently as high as 6000° or as low as 300° below zero, Fahrenheit—and with vacuums and great pressures, Units of UCC now separate or combine nearly one-half of the many elements of the earth.

UNION CARBIDE

AND CARBON CORPORATION

30 EAST 42ND STREET **UCC** NEW YORK 17, N. Y.

Products of Divisions and Units include

LINDE OXYGEN • PREST-O-LITE ACETYLENE • PYROFAX GAS • BAKELITE, KRENE, AND VINYLITE PLASTICS
ACHESON ELECTRODES • EVEREADY FLASHLIGHTS AND BATTERIES • NATIONAL CARBONS
PRESTONE AND TREK ANTI-FREEZES • ELECTROMET ALLOYS AND METALS • HAYNES STELLITE ALLOYS • SYNTHETIC ORGANIC CHEMICALS

GOOD NEWS *from General Electric*

FOR CAR OWNERS

... a new lifetime finish



A finish that will retain its original brightness and gloss as long as your car lasts—that is the goal which General Electric chemists hope to reach with silicone resins, the new materials derived from sand.

They predict that the finish will be perfected within five years.

The paint is already under test. It has proved highly resistant to severe weather conditions, chemicals and heat. Immersed in acid and alkali solutions that would cause today's finishes to deteriorate, silicone-treated panels have remained unmarred.

FOR SMOKERS

... leakproof cigaret paper

A new G-E fault detector makes possible the production of a cigaret paper that is virtually leakproof—free of those pesky little holes that sometimes cause a cigaret to draw improperly.

Not only holes but minute imperfections in the paper are detected electronically by the instrument.

In addition to adding to smokers' pleasure, the new device will be used industrially for inspecting paper, sheet rubber, sheet mica, plastics and other materials.

FOR TRAVELERS

... peacetime radar

Radar is being used both on ships and planes to cut down the hazards of traveling in the dark, in fog, or in storms.

For planes, the General Electric Electronics Department will soon produce a radar unit weighing only about 100 pounds, designed to increase the efficiency of "all-weather" airline operations.

For ships there is the G-E "electronic navigator," which uses radar to detect the position of above-water obstacles.



FOR G-E EMPLOYEES

... life incomes after retirement

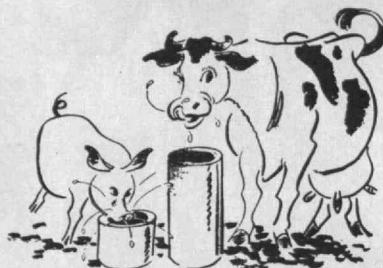
A steady life income after retirement is offered all G-E employees under provisions of a hundred-million-dollar pension plan recently announced by General Electric.

For the average employee this will mean a retirement income several times as large as the annuity he could ordinarily buy. Income at retirement, when added to Social Security payments, will amount to about 50% of average pay for the employee who has spent his working years with the Company.

Other G-E "job dividends," those extras that employees get in addition to wages, include insurance, vacations with pay, and achievement awards.

FOR FARMERS

... a stock drinking cup



One of the latest direct applications of electricity to the farm is an electrically heated automatic stock drinking cup. A clean, fresh, year-round, outdoor water supply for livestock is now possible with this drinking cup.

Designed for use in sub-zero weather, it consists of a Calrod-heated drinking cup, enclosed in a durable metal housing, and fed from the farm water supply system by an electrically heated water pipe. Livestock simply nose down a treadle in the base of the cup, causing water to flow automatically.

A thermostat automatically maintains the water in the cup and pipe at a temperature safely above freezing.

FOR HOMEMAKERS

... the Circline lamp

The Circline lamp is a circular fluorescent lamp. A 32-watt bulb of this type gives as much light as a 100-watt incandescent lamp.

These lamps, which set a new style in lighting, shed a soft, cool light from a diffused area instead of a single lighting point.

GENERAL ELECTRIC

PROPOSED CHILDREN'S MEDICAL CENTER, BOSTON, MASS.



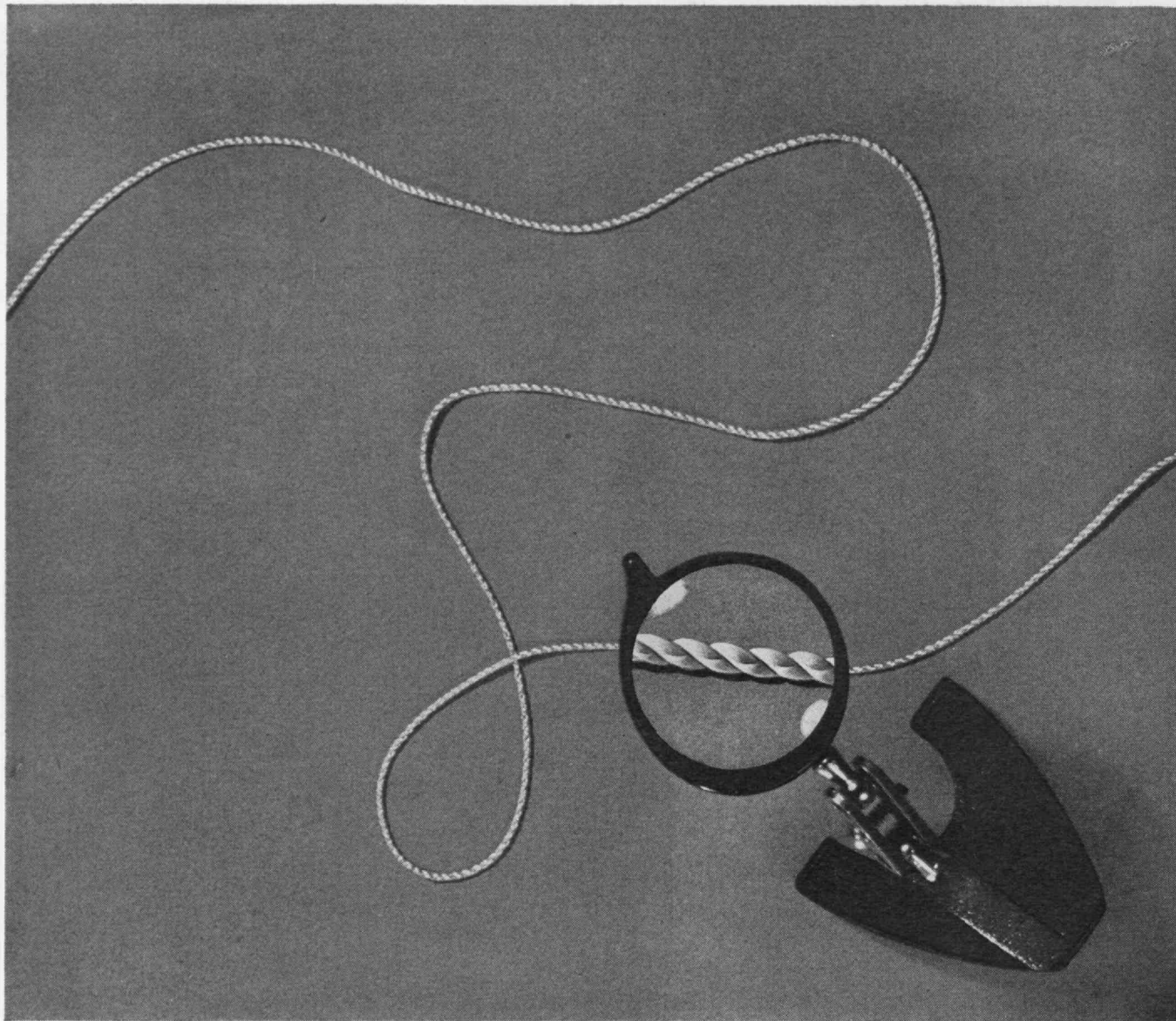
CASE FOR A SPECIALIST....

Our broad experience and specialized knowledge in every phase of engineering and construction often are employed during the period of preliminary planning as well as for actual construction of institutional buildings.



STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY OF STONE & WEBSTER INC.



It's the wonderful new twist to tire mileage!

ANOTHER REASON FOR GOODYEAR LEADERSHIP

You are looking at a picture that began almost 20 years ago — when Goodyear first experimented with rayon cord for tires.

That was the initial step. Over 15 years ago, Goodyear built the first rayon cord tire — perfected it — and when war came Goodyear was ready. Goodyear truck tires — made of rayon cord — helped speed supplies in the battle for Europe.

Today, from these strands of rayon cord are being built thousands of Goodyear passenger tires that set new records for mileage, safety, and economy!

Rayon cord tires are another in a long line of Goodyear "firsts" — the Straight-Side Tire, the Multiple-ply Cord Tire, the All-Weather Tread, the LifeGuard Safety Tube and many others. These, over the years, have made your tires last longer.

Goodyear goes right on working to benefit you — not just tomorrow, but ten years from now. It is this never-ending search for something better that helps explain why it's true today — as it has been for 32 straight years — "More people the world over ride on Goodyear Tires than on any other kind."

A pioneer in rubber, and the world's greatest tire company, Goodyear also has broad experience in many other fields — metals, fabrics, chemicals, plastics — constantly developing new products that will serve you better.



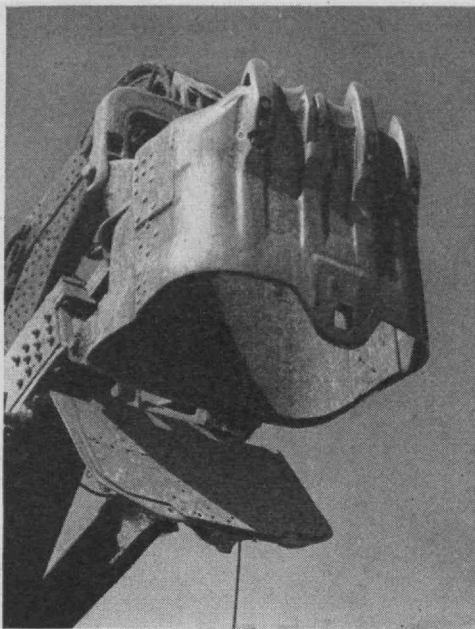
THE GREATEST NAME IN RUBBER

THE TECHNOLOGY REVIEW

TITLE REGISTERED U. S. PATENT OFFICE

EDITED

AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY



W. La Varre, from Black Star

"Let's Eat"

CONTENTS for JANUARY, 1947

THE COVER — AMES AERONAUTICAL LABORATORY, MOFFET FIELD, CALIFORNIA
Official photograph, National Advisory Committee for Aeronautics

NIGHT SENTINELS	FRONTISPIECE	146
ORIENT MAILS, "VIA PACIFIC"	By H. E. LOBDELL	151
<i>American side-wheelers dominated the Pacific trade routes 80 years ago</i>		
PENICILLIN AND STREPTOMYCIN	By R. E. GRUBER	155
<i>Complement each other in safeguarding man's health</i>		
VACUUM IN THE HOME	By SIGFRIED GIEDION	157
<i>Today's vacuum cleaner — lineal descendent of the Nineteenth Century carpet sweeper</i>		
PROGRESS IN LOW TEMPERATURE REFRIGERATION	By S. C. COLLINS	161
<i>Opens the way for the production of gasoline from natural gas</i>		

☆ ☆ ☆

THE TABULAR VIEW	138
<i>Contributors and Contributions</i>	
THE TREND OF AFFAIRS	147
<i>News of Science and Engineering</i>	
THE INSTITUTE GAZETTE	163
<i>Relating to the Massachusetts Institute of Technology</i>	

Published monthly from November to July inclusive on the twenty-seventh of the month preceding the date of issue, at 50 cents a copy. Annual subscription, \$3.50; Canadian and foreign subscription, \$4.00. Published for the Alumni Association of the M.I.T.: Alfred P. Sloan, Jr., Honorary President; Harold Bugbee, President; Alf K. Berle, C. George Dandrow, Vice-presidents; H. E. Lobdell, Executive Vice-president; Charles E. Locke, Secretary; Ralph T. Jope, Treasurer. Published at the Rumford Press, 10 Ferry Street, Concord, N. H. Editorial Office, Room 7-203, Massachusetts Institute of Technology, Cambridge 39, Mass. Entered as second-class mail matter at the post office at Concord, N. H. Copyright, 1947, by the Alumni Association of the Massachusetts Institute of Technology. Three weeks must be allowed to effect changes of address, for which both old and new addresses should be given.

Publisher • H. E. LOBDELL

Editor • B. DUDLEY

Business Manager • R. T. JOPE

PAUL COHEN

Editorial Associates

J. J. ROWLANDS

T. L. DAVIS

J. R. KILLIAN, JR.

P. M. MORSE

E. R. SCHWARZ

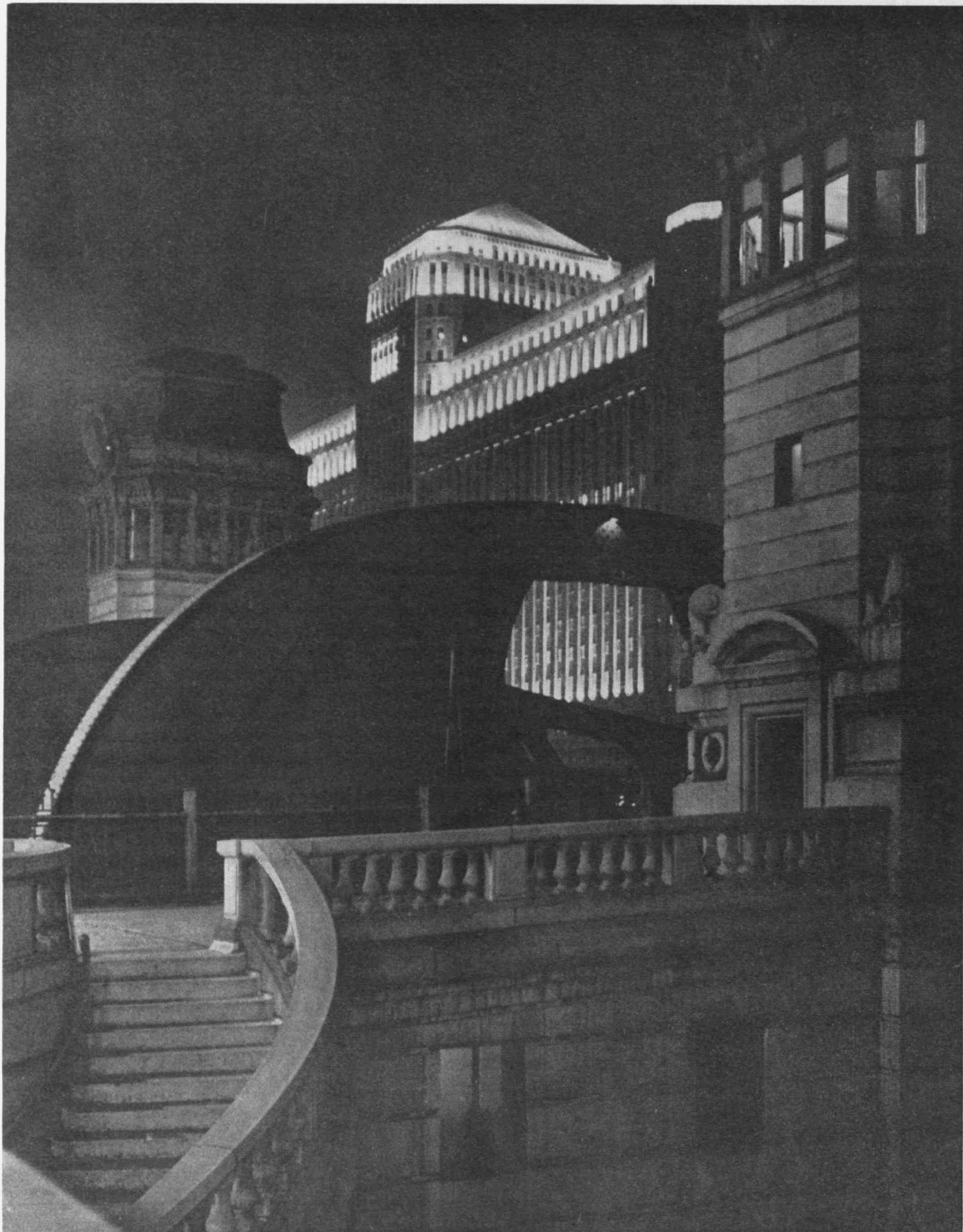
F. G. FASSETT, JR.

WILLY LEY

F. W. NORDSIEK

D. O. WOODBURY

Staff { Editorial: THEODORA KEITH, RUTH KING
Business: MADELINE R. MCCORMICK



Torkel Korking from Black Star

Night Sentinels

"But they, while their companions slept, were toiling upward in the night."

The Ladder of Saint Augustine — Henry Wadsworth Longfellow

THE TECHNOLOGY REVIEW

Vol. 49, No. 3

January, 1947



The Trend of Affairs

Prospect and Retrospect

IN keeping a time-honored tradition, we close the old year with retrospective glances at past achievements and look to the coming of the new year with the perennial hope that it will constitute a brighter chapter in the world's history. It is well that we take stock, from time to time, of the progress that has been made in many fields. By viewing recorded experiences, we shall find a springboard to the progress of tomorrow.

The year 1946 saw less accomplishment in the fields of international peace and industrial good will than might have been desired. Conspicuous was a restless insurgence, characteristic of post-war reconversion eras. Yet, in spite of altercations concerning international and industrial issues, of annoying shortages of food, clothing, and shelter, of our inability — or unwillingness — to forge ahead in reaching our vast production potential, there were luminous spots in the year's activities. A wave of adults seeking education absorbed facilities of the country's colleges, many wartime restrictions and controls were rescinded, and aggressive wars were placed in the category of criminal activities by an international tribunal. Substantial gains were made in science and in technology, a few of which will receive proper attention after a re-kindling of the highlights of achievements made during years ending in 7. Progress in mechanical inventions and in the development of electricity are of such import as to be singled out for special mention.

As far back as 1797, David Wilkinson invented the gauge and lathe and in the same year Charles Newbold was granted a patent for the first cast-iron plow. Two decades later George Clymer invented the bicycle and the first machine-made paper produced in this country came from the paper making machine of Thomas Gilpin. In 1837 Henry Crawford of England, made a considerable contribution with his process of galvanization which greatly reduced rust formation.

An even century ago this coming year, the Bessemer

process for making steel was invented and David Smyth devised a machine for making books. The patent for a harrow, issued on August 7, 1847 to G. Page, showed a single revolving disc on one side of the plow.

The genius of Charles Webb gave the world the adding machine 80 years ago; the same period saw the invention of the four-cycle gas engine by N. A. Otto. In 1867 Burd-sall Hooley conducted the first successful experiments in central heating by transmitting heat through pipes for a distance of 100 feet from his home.

Germany held the spotlight 50 years ago with three important inventions. In 1897 Goldschmidt invented the thermit process, Walter Nernst evolved the lamp named after him, and the Diesel internal combustion engine came into being.

Many significant contributions to electrical technology were brought to light during years whose last digit is six plus one. Just 200 years ago, Benjamin Franklin wrote of his experiments with the electric kite, from which he deduced the electrical nature of lightning. At the same time he also proposed his single fluid theory of electricity in which the two states of electrification then known were regarded not as the result of two different fluids but as an addition or subtraction of a single fluid. In modified form, Franklin's concept prevails today. Franklin's superlative gift for accomplishment was again displayed in 1757 with the invention of the lightning rod.

During the Nineteenth Century electricity was transformed from an interesting curiosity to a powerful agent that would subsequently become the backbone of our industrial way of life. Sir Humphrey Davy announced the electrical decomposition of potash and soda from which he obtained potassium and sodium in 1807. Two decades later George Simon Ohm in Germany published his celebrated paper in which he introduced a clear idea of the relationship between the current and the electromotive force in a circuit containing resistance. Also in 1827 an interesting and curious observation was made by Felix Savart who found that a needle magnetized by the

discharge of a Leyden jar would sometimes show the north-seeking pole at one end of the needle and at other times at the other end.

In England in 1837 Michael Faraday endowed electric charges with new garb by surrounding them with lines of force. The sine and tangent galvanometers, invented by C. S. M. Pouilet of France in the same year were certainly among the earliest of electrical measuring instruments. The third outstanding development of that year occurred in the United States; Samuel F. B. Morse disclosed his idea for an electric telegraph system.

Exactly one century has passed since Helmholtz prepared his paper on the conservation of force, extending to all the domains of physics, a concept developed five years earlier by Mayer. On March 5, 1857, Alexander Graham Bell was born.

Disaster overtook the first Atlantic cable which broke on August 11, 1857 while being laid, but ten years later William Thomson (who had not yet acquired the title of Lord Kelvin) advanced communication over the cable by his invention of the siphon recording receiving apparatus. The year 1867 also saw extensive distribution of the first paper by James Clerk Maxwell and accounting for all electric and magnetic phenomena.

Thomas Alva Edison dominated electrical developments by 1877. In that year he invented the mechanical phonograph as well as the carbon microphone, and the Edison Electric Company of New York was being organized to generate and distribute electric power. Six decades back Heinrich Hertz had discovered that ultra-violet light acted as a conductor of electricity, and Nikola Tesla had invented the polyphase electric current system of power transmission.

The first account of the electron and its properties was given in England by J. J. Thomson half a century ago at the time when Guglielmo Marconi of Italy developed the first practical system of wireless telegraphy. In January 1907 Lee DeForest was granted a patent for his three-element electron tube—a device which was to become the cornerstone of electronics. In the same year DeForest is credited with having been the first to use the carbon microphone in experiments with radio telephony. The year 1947 will mark the twenty-fifth anniversary of the beginning of commercial broadcasting (on a wide scale) in the United States.

Having advanced to events of the Twentieth Century, we stop briefly to record three events in the communication field which took place in 1927. The Bell Telephone Laboratories gave the first demonstration of television apparatus to operate over any considerable distance with the simultaneous transmission of aural and visual signals between New York and Washington. This was also the year in which radio receiving sets designed for complete alternating current operation were introduced, the Federal Radio Commission was established to regulate the radio industry, and the Columbia Broadcasting System was formed.

We conclude this survey by reviewing a few significant developments recorded during the past year. In the field of aviation, supersonic waves were used successfully to convert fog into rain for clearing landing fields. An instrument, called the cloud detector, was devised to make night flying safer by measuring the infrared radiation from clouds. A system of push-button flying that enables airplanes automatically to take off, fly, and land safely

was also demonstrated. . . . In atomic physics, mesotrons—the particles which are believed to hold the atom nuclei together—were accurately measured for the first time and were found to have a mass 202 times that of an electron. . . . Developments in electronics were advanced by the invention of a new vacuum tube amplifier, called the travelling wave tube, which gave promise of greatly increasing the amount of information that could be transmitted simultaneously over communication channels, and the magnifying power of the electron microscope was doubled by an improved magnetic lens which makes possible the distinguishing of particles separated by a mere 50 billionths of an inch. . . . Most spectacular radar development of the year was the transmission of signals to the moon and the reception of the echo after a lapse of $2\frac{1}{2}$ seconds for signals to make the round trip. . . . In the radio field, radiotelephone equipment was installed in taxis, buses, and service trucks. Radio beams were focused into a sharp beam by a metal lens antenna used in micro-wave systems, and facsimile transmission of pictures and printed material was accomplished between Boston and New York. . . . When Congress passed the National Mental Health Act, which recognizes mental health as a serious problem worthy of public support and appropriations, it opened the doors for further improvement of the public's health. An aid to the deaf was given by the invention of the sound spectrograph, a device by which sounds are reconverted into visual patterns that can be read and interpreted as speech. The blind were equally benefited; an electronic seeing eye which is capable of detecting the distance and direction of objects within a distance of 20 feet is more than a worthy invention.

The technical and scientific achievements of the past year are indeed gratifying, and it is with deep interest that the work of science in enriching the world will be watched during the coming year. Would that man also recognize his obligations toward civilization and individually take active part in the establishment of a permanent peace. *De nihilo nihil fit.*

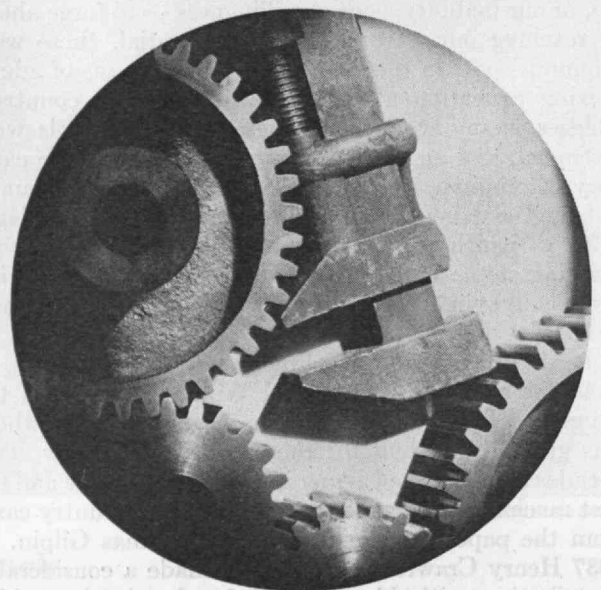


Photo by H. Armstrong Roberts

It doesn't take many monkey wrenches to put our complex industrial machine badly out of synchronization.

The Record

OPENING with what was probably the most extensive wave of strikes in the history of the United States, the year 1946 draws to a close facing the threat of a new period of unrest. Particularly after a war there is nothing new in the jockeying for economic advantage between management and labor, and the liberal use of labor's basic weapon — the strike. More than four million men were involved in 3,600 strikes in the United States during 1919, a year which was marked by unusual industrial unrest in Great Britain and Germany as well as in this country. By 1923, however, the various indices of labor-management strife had subsided to a level which was more or less average for the between-war period. Using the years 1920 to 1938 as a base, this country had an average of 1,660 strikes, involving 800,000 workers each year.

With the returns in for only the first ten months of 1946, it is certain that this year will be marked by a record number of strikes and strikers. Probably a more revealing statistic, however, is the number of idle man-days resulting directly from strikes, a figure which has been available only since 1927. For the pre-war period of 1927 to 1938, the average loss per year was about 14,000,000 man-days, a figure which averaged about 11,000,000 man-days per year during World War II. Since the end of the war, industrial strife has skyrocketed to the extent that each of the first four months of 1946 could boast the dubious distinction of equalling or exceeding the 1927-1938 annual average. In fact, the combined figures for January and February 1946 show a larger total of idle man-days than that of any previous year. The 102,525,000 idle man-days accumulated up to the end of October (a figure unparalleled in American history) can be compared only to the 162,000,000 man-days lost in Great Britain in 1926, the year of the general strike.

Obviously the figure of man-days lost does not give a complete picture of the production losses imposed by strikes. In February, the most strike-bound month for which 1946 figures are available, the idle man-days resulting from strikes represented but 3.94 per cent of the total available working time, compared to less than one

per cent in normal years. Even though the absolute value of the losses represented by these percentages is huge, of themselves, they would not appreciably alter our indices of production. But as strikes increase in duration and extent, losses snowball in exponential fashion and the consequences are particularly severe when an entire basic industry is affected.

The trucking and shipping strike, from which New York City has but recently emerged, provides excellent example of the geometric progressions which may ensue as a result of industrial disputes between obdurate groups which are not numerically significant. Probably not one per cent of New York's working population was engaged in the trucking and shipping strike, but for eight weeks inbound railroad freight was cut to about one-fifth of its normal volume and, at the same time, outbound freight was cut almost in half. The monetary losses for the city are estimated at \$1,500,000,000 — well beyond \$100 per capita for New York's population and more than \$10 for every man, woman, and child in the United States. Such a sum would be sufficient to operate M.I.T. for a period of 150 years at its present \$10,000,000 budget for 1947, or it might have operated M.I.T. and the Radiation Laboratory for 37½ years at the war-time peak of \$40,000,000 expended in 1945.

American labor has entered the post-war era at a peak in numbers, in organized strength, and in legal standing. It strives to retain and improve its economic position — a function in which every segment of our economy engages. In some of the more important strikes of the first nine months of 1946, laboring groups have pitted 200,000 automobile workers against the General Motors Corporation, 200,000 electrical workers against the Westinghouse Electric Corporation, the General Electric Company, and the General Motors Corporation, 190,000 men against the packing houses, 700,000 persons against the steel industry, 150,000 maritime workers against the ship lines, and 350,000 bituminous (not to mention 75,000 anthracite) coal miners against the solid fuels industry.

This year's strikes have not only involved an unusually large number of persons; many of them have also been unusually long. During the early part of the year, quick settlements for wages, based on what labor could get for its work and the price industry could ask for its products in a free market, were frequently hindered by the continuation of wartime price controls. But many other issues were involved, some of them far more important to the future relationships of management and labor than any immediate question of money. With both management and labor in relatively good condition to withstand the losses of prolonged strikes, it is not surprising that some battles ensued — battles in which consideration of the public interest often was conspicuously lacking.

Not without creating resentments which some day will have to be corrected, one by-product of these struggles has been a tendency for the wages of organized groups of employees to rise at a faster rate than those of traditionally higher ranked groups — teachers, engineers, technicians, and other white collar skilled employees. The paralysis of wide-spread industrial operations, or the forced unemployment of hundreds of thousands of workers by a comparatively few strategically placed obdurates, has focused attention on another by-product; the increasing disregard of public welfare and the growing lack of self-control inimical to the philosophy and practice of

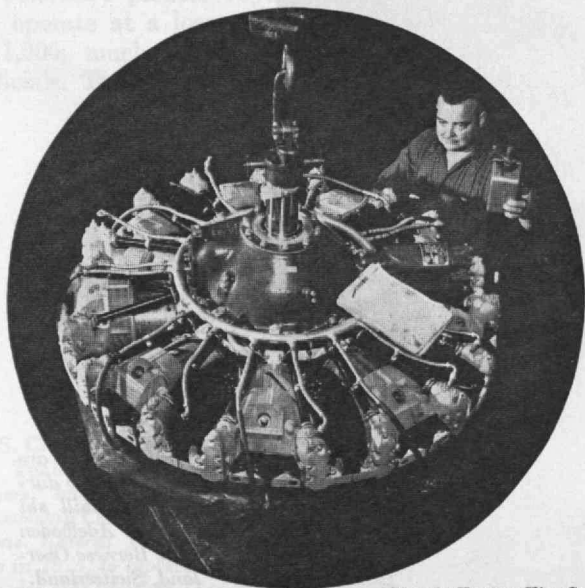


Photo by Keystone View Co.

The productivity of labor determines the size of the economic pie that the American people produce and divide.

democracy. Although not yet marked by sufficient progress to have much bearing on current disputes, increasing attention has been directed to a third by-product — a technological one which seeks substitutes for strike-bound services and products.

That strikes have not cleared the air in all cases is indicated by complaints in some industries that worker productivity is falling, thereby reversing a trend of long standing in the United States. In part, this is probably a temporary phenomena, associated with reconversion and with interruptions in the flow of materials and sub-assemblies resulting from strikes and from the chaotic relationships of supply and demand. It doesn't take many monkey wrenches to put our complex industrial machine badly out of synchronization. But that part of the drop in production which is due to bitterness and suspicion between labor and management calls for immediate attention.

Before the war broke out, administrators were beginning to give widespread and deliberative thought to the factors which determine worker morale, of which finances are but one aspect. There is evidence that this trend is being resumed, and that we are on our way to make sound human relationships in industry the first task of management. But — as is so ably brought to light by Paul W. Litchfield, '96, in his rational and thought-provoking volume, *The Industrial Republic* (Corday and Gross) — this objective must be sincerely sought by both disputants, for no real progress can be made so long as either side is forced into a policy of appeasing the other.

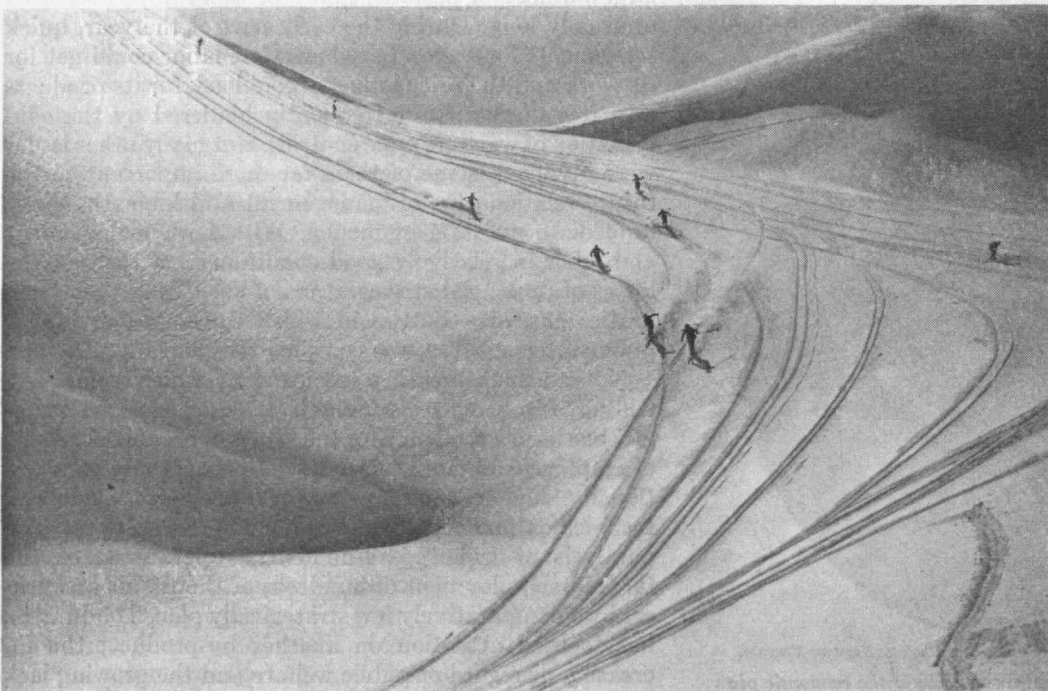
In thumping the barrel head of social gains, it is easier to obtain a following by advocating higher wages than by advocating the less materialistic concept that, in a democracy, the welfare of the general public has a higher priority than that of any minority group, however powerful. But even this purely dollars-and-cents appeal can be overworked. The productivity of labor determines the size of the economic pie that the American people produce and divide, and for any group a larger piece of a smaller pie may turn out to be no bargain.

124 Man-Years to M.I.T.

FERRIS GREENSLET'S latest best seller, "The Lowells and Their Seven Worlds" (Houghton Mifflin), contains a half chapter devoted to the distinguished architectural career of the late Guy Lowell, '94, whose professional achievement culminated in the 15 years between 1912, when he won the competition for the great new Court House for the City of New York, and 1927, when the completed building, described as "a hexagon instead of the full circle, the amphitheatre of his first conception," was dedicated a week after its architect's death. Technology interest in this felicitously compounded volume, however, depends not alone upon the fact that Guy, after four years preparation at Harvard College, matriculated in 1892 at M.I.T. from which two years later he received an S. B. degree in architecture under the guidance of Francis Chandler and Desire Despradelle before proceeding overseas to the École des Beaux Arts; nor upon the fact, which escaped Dr. Greenslet's notice, that Guy was a member of the Institute's instructing staff from 1899 to 1912 as a lecturer on landscape architecture.

Although the name of Lowell did not appear on the roster of incorporators associated with William Barton Rogers in the fateful spring of 1861, that oversight was soon remedied. On May 6, 1862 at the first meeting of the Massachusetts Institute of Technology, John Amory Lowell (of the eighth generation of Percivale Lowle, and son of John Lowell, "The Rebel" who founded the Lowell Institute) was elected to life trusteeship and also as one of the four vice presidents. He continued as vice president of M.I.T. until 1870 when that office was suspended until the election of Vannevar Bush, '16, in 1932.

In 1873, eight years before the death of John Amory Lowell, his son Augustus also was elected a member of the Corporation on which he was to serve for more than a quarter of a century, and serving so nobly that in 1916, when the new Technology was dedicated in Cambridge, his name, and that of Coleman (*Continued on page 182*)



Graceful curves are left in the snow during a downhill ski race at Adelboden in the Bernese Oberland, Switzerland.

Photo by A. Klopfenstein

Orient Mails "Via Pacific"

Monster American Side-Wheelers, the Largest Wooden Commercial Steamers Ever Built, Pioneered a 7,500-Mile Artery of Global Trade

BY H. E. LOBDELL

EIGHTY years ago this January, mail steamship service to the Far East began under the American flag with the sailing of the Pacific Mail Steamship Company's *Colorado* from San Francisco, promptly at noon on New Year's Day of 1867. This three-year-old wooden side-wheeler, 340 feet in length and in tonnage a bit over 3,700, reached Yokohama on the morning of January 24. There she coaled and on the following day resumed her pioneer voyage, arriving at Victoria, Hong Kong, by midnight of January 30.

At Victoria she spent a fortnight during which, according to a newspaper account appearing after her return to San Francisco in the local *Alta*, there was an "excursion around Hong Kong island with about 1,000 invited guests . . . 'A rush was made for the dining saloon, and the clatter of knives and forks, and the flying of champagne corks could be heard in every direction. There was just as much of everything as was wanted, and everything being free, they just went into the good things like old soldiers.' The band of the Twentieth Regiment was aboard, a quadrille was made up, and dancing went forward in spirited fashion until the ship returned to anchor" — all of which contributed to the happy result that *Colorado* made a favorable impression on the British in Hong Kong, and sailed eastbound with a good passenger list and far more freight than had been anticipated. Leaving Victoria February 17, she coaled again at Yokohama February 25-27, and docked at San Francisco at 9 A.M. on March 20.

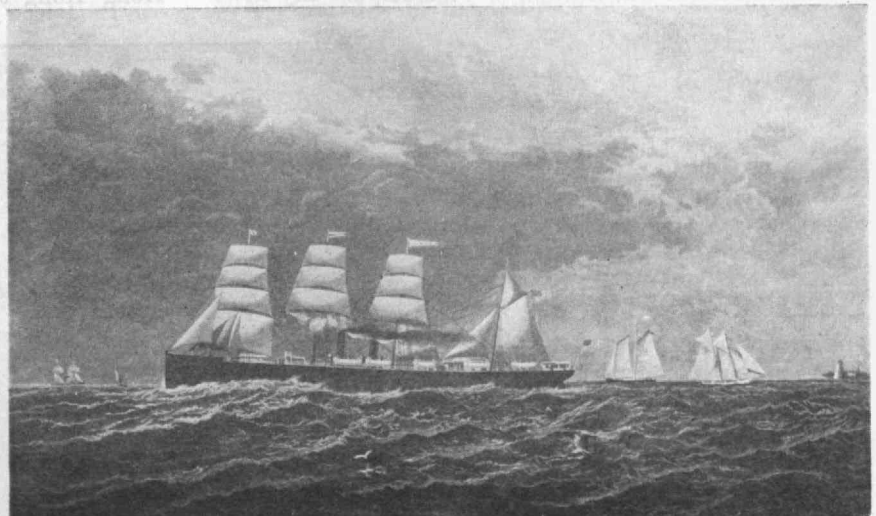
Colorado's pioneer voyage, which had been budgeted to operate at a loss, actually yielded a profit of some \$11,000, much to the astonishment of Pacific Mail's officials. Throughout 1867 and up to September 1868,

service was regularly maintained at six-week intervals; and then, when *Colorado* had been supplemented by *Great Republic*, *China*, and *Japan* — three of the four enormous wooden paddle-steamers especially designed and built for the San Francisco-Hong Kong run — monthly departures in each direction became effective.

To American interests engaged in the ever-expanding potentialities for commerce with eastern Asia during the period immediately following the close of the Civil War, the advent of this new and dependable means of communication "via Pacific" with correspondents in the Far East was indeed a boon, and its influence was soon reflected statistically. When President Lincoln, less than two months before he was assassinated, signed the Act of February 17, 1865 authorizing the "Establishment of Mail-Steamship Service between the United States and China," our Far Eastern trade was declining and passing into foreign hands. By 1869, however, our total exports to Japan and China were over half again as much as they had been in 1866, and our imports therefrom amounted to one-third more. In dollar volume American trade with eastern Asia had risen to \$32,786,231, an increase of 44 per cent in three years.

One very tangible factor in causing this striking reversal of trend between 1866 and 1869 was the opportunity afforded American merchants to communicate postally via Pacific less expensively and more expeditiously with their agents in Yokohama, Hong Kong, and the open Treaty Ports of China — and especially with their agents in Shanghai, between which rising commercial metropolis of north China and Yokohama the Pacific Mail instituted a branch service to connect with the arrival and departures of the liners plying the San Francisco-Yokohama-

S.S. *City of Peking* and S.S. *City of Tokio*, 5,500-ton iron screw liners, built for Pacific Mail Steamship Co. by John Roach and Sons. Entered Transpacific service in 1875, to replace the earlier wooden side-wheelers. (Length 423 feet; breadth, 48 feet; depth, 38 feet.)





Hong Kong to Boston in 1868, Transpacific per fourth eastbound voyage of Colorado — to San Francisco, and thence to eastern seaboard via Panama.

Hong Kong main route. Previously American merchants had suffered a definite disadvantage compared with their European competitors, since the only regularly scheduled means by which their letters could be exchanged with China or Japan was by the governmentally subsidized mail-packets of the British Peninsular and Oriental Steam Navigation Company or the French *Compagnie des Messageries Impériales*, whose Far Eastern operations dated from 1845 and 1862, respectively.

To use either of these British or French postal services most favorably an American merchant was obliged to send his letter trans-Atlantic to connect with the scheduled departure of a steamer from Marseilles for Alexandria, from which latter port mails were conveyed overland across Egypt to Suez, thence down the Red Sea and eastward to Ceylon, Singapore, and eventually to their destinations at the ports of eastern Asia. Not only were all postal charges via Suez high (and American correspondence of course required additional franking to cover the trans-Atlantic passage), but it took approximately two months for a letter sent by this route from New York to reach Hong Kong, and 10 days or a fortnight more for it to reach Shanghai or Yokohama. Moreover, an answer sent to the United States westward over this route cost 54 cents per half ounce from Hong Kong, and by the time it reached New York, Boston, or Philadelphia any news

conveyed as to the latest "prices-current" on the China coast was already common knowledge eight days earlier in London or Paris. American merchants located on the Pacific slope were, of course, under an even greater handicap, and as a practical matter their urgent correspondence transmitted via Suez had to be dealt with between California and the East by using the relatively expensive telegraph which had become available trans-continently in October, 1861.

With the opening of mail service via Pacific in 1867, a half-ounce letter could be sent from Hong Kong to any part of the United States for only eight cents. (In the opposite direction the rate was 10 cents.) Such a letter would reach San Francisco within a month, and even if directed to a point on the eastern seaboard, which meant that it would be forwarded roundabout by way of the Isthmus of Panama, it would arrive in New York as quickly as if it had been sent westward from Hong Kong via Suez. By June, 1869, however, mails began to move trans-continently across the United States by rail and the time requirement between San Francisco and New York was cut to less than eight days. This meant that the mail-transit time from Hong Kong to New York via Pacific approximated five weeks, which was quicker (as well as cheaper) than if a letter were sent via Suez from Hong Kong to London and its contents were cabled

Shanghai to Iowa in 1867, by U. S. Post Transpacific — from Yokohama per maiden eastbound voyage of China to San Francisco and thence to eastern seaboard "via Panama."



Shanghai to New York in 1870 by U. S. Post Transpacific — per Golden Age of P. M. S. S. Co. to Yokohama, thence by main-line steamer of Pacific Mail to San Francisco, and “via overland” by rail to New York.



onward to New York by the “Atlantic Telegraph,” which had come into operation at about the time the Pacific Mail’s steamships began to ply regularly to Japan and China.

Historical Prelude to Mail Steamship Service Via Pacific

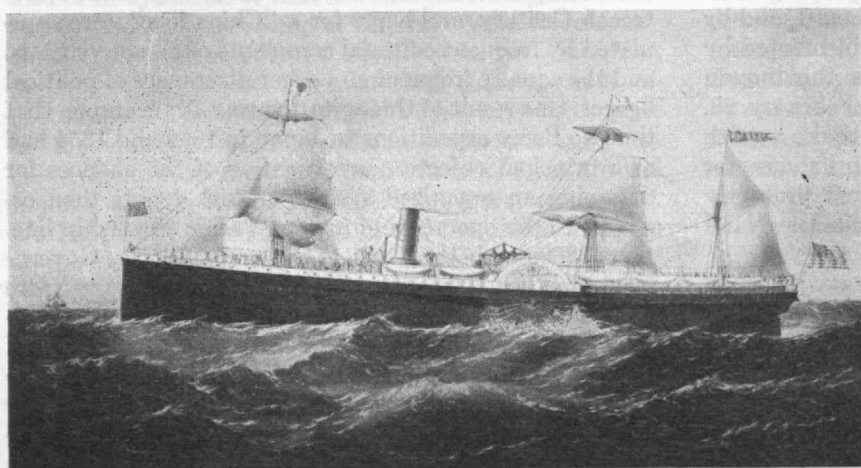
Official thoughts about a trans-Pacific steamer service are recorded as early as 1848, for in May of that year T. Butler King, on behalf of the House Committee on Naval Affairs, recommended early consideration of steam navigation to the Sandwich Islands and China. Also Robert J. Walker, Secretary of the Treasury, in his annual report rendered the following December, blessed the idea as follows:

This tranquil ocean, as indicated by its name more subject to calms, is better adapted to steam than the more boisterous Atlantic, and with less danger of injury to the machinery. The calms of the Pacific, so often retarding the sailing vessel, make shorter and safer the voyage of the steamship, whilst at other periods the trade winds blowing for months continuously in one direction, not affecting the course of the steamer, but forcing sailing vessels so many thousand miles out of their way, render steam necessary to the profitable navigation of that ocean. For all these causes, the Pacific must become the principal theatre of the peaceful triumphs of the great expansive power of steam, and we must extend its use there, under our own flag, if we would desire to contend successfully for the trade and specie of Asia and western America.

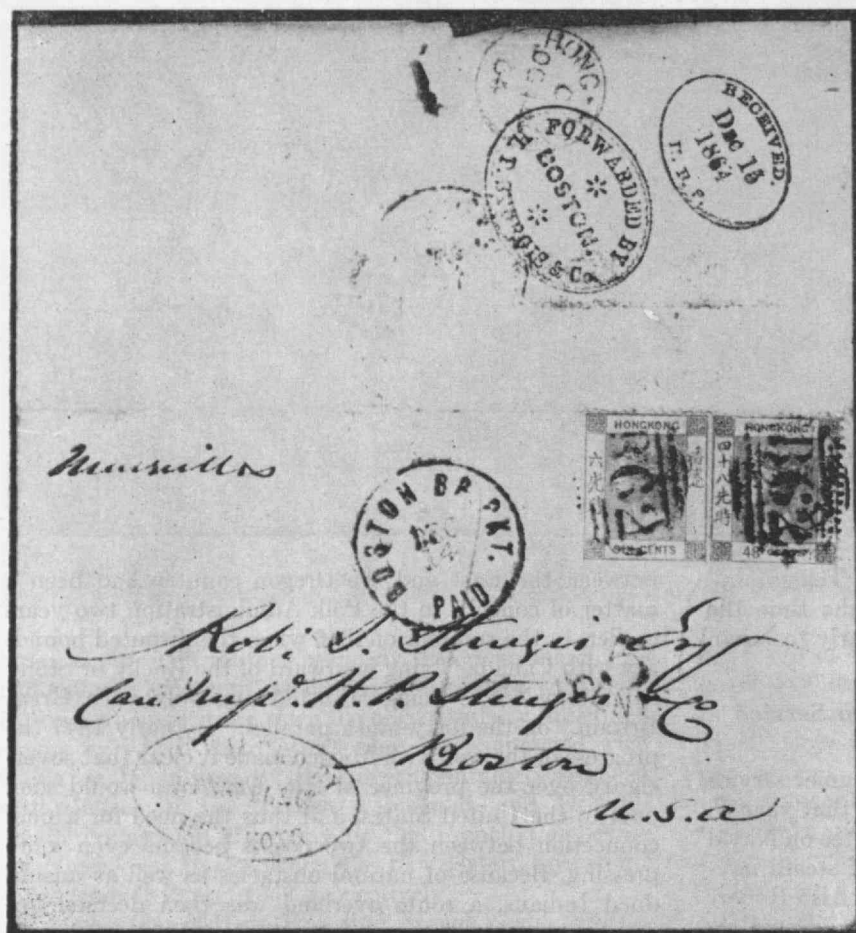
Creation of a regular and dependable postal service

between the East and the Oregon country had been a matter of concern to the Polk Administration two years earlier, in the summer of 1846 when the disputed boundary with Canada “lying westward of the Rocky or Stony Mountains” was being adjusted amicably with Great Britain “on the forty-ninth parallel.” By early 1847 the progress of the war with Mexico made it clear that sovereignty over the province of *Alta California* would soon pass to the United States, and thus the need for a mail connection between the two coasts became even more pressing. Because of natural obstacles as well as unsubdued Indians, a route overland was then deemed impracticable and the water route via Panama was chosen. Under authority of an Act of March 3, 1847 — sometimes called the Mail Steamer Bill — the Secretary of the Navy, who had to approve the designs of merchant vessels built to carry mail under government subsidies in order that they might be useful in time of war as naval auxiliaries, let two contracts for the “Panama Route.” That for the Atlantic portion was assigned soon to a group who incorporated under the laws of New York as the United States Mail Steamship Company in March, 1848. The Pacific portion, from Panama to San Francisco, was undertaken by William Henry Aspinwall, Gardiner Greene Howland, Henry Chauncey, and Edwin Bartlett, who also obtained a New York charter, on April 12, 1848 — as the Pacific Mail Steamship Company.

Gold was discovered in California before these charters were granted — in the tail-race of the sawmill of John



S.S. China, 3,826-ton wooden side-wheeler, built for Pacific Mail Steamship Co. by William Henry Webb of New York. Launched December 8, 1866, as *Celestial Empire*; cleared from New York July 1, 1867; entered Transpacific service as *China* from San Francisco for Yokohama and Hong Kong, October 14, 1867. Sold by the Pacific Mail in 1883, and broken up in 1886. (Length, overall, 370 feet; extreme beam, 49 feet 10 inches; load draft 20 feet 4½ inches.)



Hong Kong to Boston in 1864, by British Post via Marseilles — to Suez by the P. and O. S. N. Co., overland across Egypt, from Alexandria by the P. and O. S. N. Co. to Marseilles, overland across France and Transatlantic by British Packet — bearing 54 cents of Hong Kong adhesives.

Augustus Sutter on the south fork of the American river, on January 24, 1848 — but official confirmation of its discovery reached the East only at the time the 1,058-ton *California*, \$200,000 pioneer of the Pacific Mail's fleet, put to sea from New York on October 6th. She was bound via the Straits of Magellan, through which she was the third steamship to pass, to take her station on the run between the Isthmus and San Francisco, and by the time she came to anchor off the city of Panama, on January 17, 1849, the gold rush was on full tilt.

At Panama *California* had expected to pick up some passengers for San Francisco, brought to Chagres on the Atlantic side of the Isthmus by vessels leaving New York later than the departure of *California*; but at Panama there were waiting nearly three times as many as her designed capacity of 250. Somehow, 356 passengers in addition to her crew of 36 were squeezed aboard, and by exhausting the last of her coal supply, supplemented by burning some of her woodwork and fittings, this human cargo was deposited at San Francisco on February 28. It had been expected that *California* would make a quick turn-round at San Francisco and go back to Panama for more prospectors, but her crew and officers promptly deserted for the mines, leaving only Captain Cleveland Forbes and a lone engine-room boy to man the ship.

When *California*'s sisters, *Oregon* and *Panama*, reached San Francisco on April 1 and June 4, respectively, they were likewise crowded beyond capacity and speculators had run the price of single steerage tickets from Panama to the Golden Gate as high as \$1,000, compared with the established fares of \$250 for first-cabin, \$200 for the lower cabin, and \$100 for steerage. *Oregon*'s captain took the

precaution of anchoring at San Francisco under the guns of a warship in the harbor, and kept his crew in irons until they begrudgingly submitted to accept a tenfold wage increase. Thus, *Oregon* was the first ship to depart with the eastbound mail on April 12.

The Pacific Mail's prosperity during *California*'s lush 1850's kept pace with the mounting national importance of the region it served. Competitive shipping interests, which endeavored to cut-in on the highly profitable San Francisco-Panama traffic, were successfully overcome; and the best of the several overland stage mail-routes which had come into being by 1858, one on a weekly basis, took longer between Missouri and California than the four week average by the Panama route between New York and San Francisco. Confidence as to the future was thus the spirit of the times in the fifth decade of the Nineteenth Century, and hopes for a "China line" were stimulated by frequent editorial comments of an active press, and the equally frequent and eager utterances of political figures. One result of this agitation was, for example, that the two Perry expeditions to Japan in 1853 and 1854 had as a principal objective investigation of the chances for obtaining an organized system of coal depots then essential to the operation of a trans-Pacific steamship line.

In 1860, with the Civil War imminent, the Government at Washington, very understandably, became more immediately concerned with matters other than the petitions of merchants engaged in trading with the Orient. It was vital to speed up communication between the two coasts of the country, and in April the historic Pony Express began to provide at first weekly, and later semi-weekly, transit of letters from (Continued on page 168)

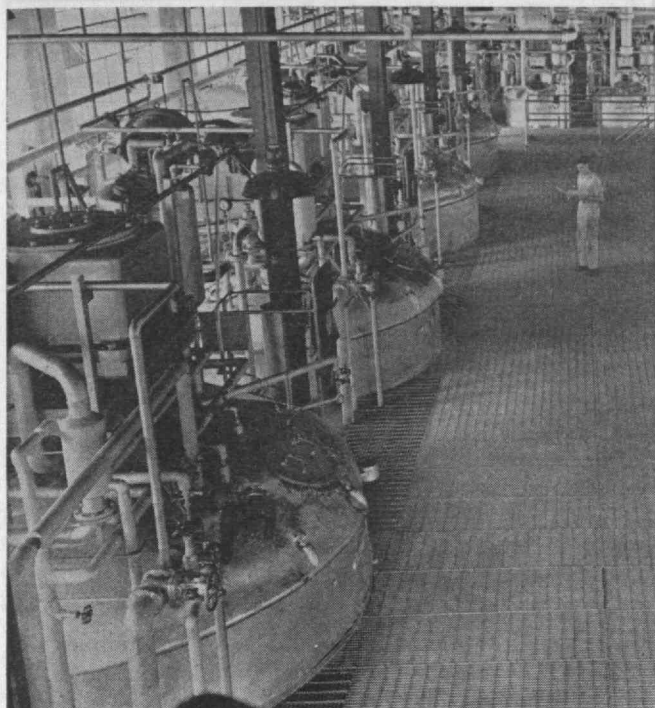


Photo by Russell C. Atkins
Fermentation units in a streptomycin manufacturing plant.

IN ITS September 16, 1946, issue *Time* magazine heralded the fact that another antibiotic had come of age with these words: "The wonder drug, streptomycin, was at last ready for general distribution among 1,600 U. S. hospitals. Last week the Civilian Production Administration, the drug's custodian, announced that current production . . . would meet all demand—except for treatment of tuberculosis." Only two and a half years earlier, on May 1, 1944, a similar announcement by the War Production Board recorded the fact that war-born penicillin had reached production levels which justified its release for limited civilian use through distribution by approximately 1,000 depot hospitals.

In an earlier article on the history and development of penicillin* the prediction was made that it was possible that a whole new group of substances, similar to this most powerful of all known chemotherapeutic agents, would be made available. This prediction has indeed come true, but not quite in the manner expected. It was thought that the knowledge of the chemistry of penicillin might either lead to its synthesis or that it would enable organic chemists to develop other compounds which were structurally similar to, and equally as effective as, penicillin, but perhaps easier to use. Chemists had come to such expectation on the basis of previous experience with some of the vitamins, where synthetic production soon followed upon isolation of the pure vitamins from natural sources, as soon as the molecular structure was known. During World War II, the study of the chemical phase of the penicillin problem was undertaken by teams of eminent organic chemists in universities, and in governmental and industrial laboratories in the United States, Great Britain, and Canada. The results of this wartime co-operative research are now being made public; so far there seems to be no indication that synthesis will replace the natural, i.e., microbiological, production of penicillin.

* The Technology Review, March, 1944.

Penicillin and Streptomycin

Supplement Each Other in Safeguarding Man's Health

BY RUDOLF E. GRUBER

The chemical research program has resulted in great benefits to the effectiveness of penicillin production, nevertheless. Advanced knowledge of penicillin's chemical structure has disclosed the fact that clinical penicillin is not a single substance, but somewhat like the vitamin B complex, consists of a number of components, closely related in composition and action, yet having distinct chemical, as well as biologic, characteristics. Four of these penicillin factors are at present identified and are designated as penicillins *G*, *F*, *K*, and *X*, respectively. Penicillin *G*, a pure crystalline substance, appears to be the most desirable member of the group, combining ease of toleration and clinical effectiveness with enhanced heat stability. Crystalline penicillin *G* is the official reference standard for the assay of clinical penicillin.

Penicillin Production

The contributions of the microbiologists to the phenomenal advances in both improvement of quality and increase in production of penicillin have been manifold. New strains of *Penicillium* have increased the yield of penicillin in the fermentation broth. Some of the new strains have been isolated from nature while others, like the famous X-1612 and Q-176, have been obtained as mutations from previously known organisms by means of x-rays. Total monthly penicillin production capacity in the United States has exceeded three trillion (3,000 billion) Oxford units, and the potency and purity of the final product have been constantly improved. The latest developments are the pure crystalline forms previously mentioned. The price of the once rare drug has rapidly decreased as penicillin went into mass production, and as manufacturing economies and higher yields have been achieved. There is no longer any economic bar to the use of penicillin in any bacterial infection in which the drug is indicated. Medical knowledge of the therapeutic value of penicillin has increased considerably, and, through the experience gained in tremendous war use, has become so precise that the outcome of penicillin treatment can be predicted with remarkable accuracy.

The production miracles accomplished by America's penicillin pioneers made it possible to supply a tremendous foreign demand over and above military and civilian needs at home. Only recently, Great Britain, the homeland of the discoverer of penicillin, saw the completion of huge

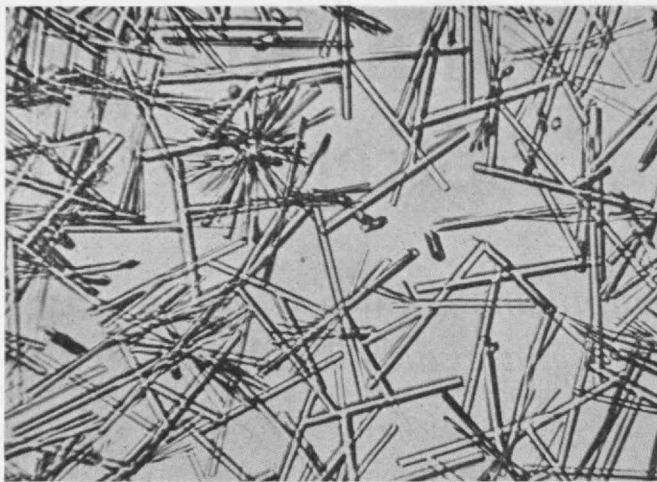


Photo by Merck and Co.

Microphotograph of crystals of streptomycin calcium chloride.

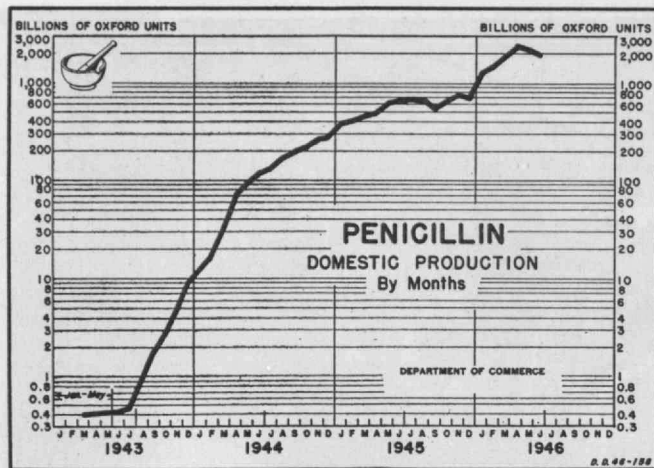
production facilities, largely employing American knowledge and techniques. Canada is already self-sufficient through Dominion production. With American aid, war-ravaged France will soon be able to take care of a large part of its requirements through domestic production. It is, perhaps, not generally known that scientists at the Pasteur Institute in Paris had experimented with penicillin during World War II, and hid their work successfully from the prying eyes of the German occupational authorities. As a result of this covert research, a small pilot plant was placed in operation in Paris immediately after the liberation of the city!

High honors have been bestowed deservedly on the British scientists responsible for penicillin's discovery. Both Dr. Alexander Fleming and Dr. Howard Walter Florey were elevated to knighthood by a grateful Britain. With their chemical associate, Dr. Ernest Boris Chain, they received the coveted Nobel Prize in 1945. American penicillin manufacturers expressed their appreciation in a substantial manner by presenting to Sir Alexander Fleming, in the fall of 1945, a trust fund of \$100,000 for financing research work to be conducted under his direction at St. Mary's Hospital Medical School at the University of London. The University of Pennsylvania was named administrator of the Fleming Fund, in tribute to Dr. Alfred N. Richards, Vice-president of the University, who, as chairman of the Committee on Medical Research of the Office of Scientific Research and Development (of which Dr. Vannevar Bush, '16, is Director), first supported and encouraged penicillin studies in this country, with immeasurable benefit to the health of our Armed Forces and civilian population.

Origin of Streptomycin

With the recognition of penicillin's amazing clinical value, research on the production of other antibacterial substances derived from the products of metabolism of molds and fungi proceeded apace. Literally, tens of thousands of molds and similar microbial organisms were tested for the antibiotic properties of their metabolites. The most outstanding advance in this field is streptomycin, an antibiotic obtained from the metabolism of a species of myces *Streptomyces griseus*.

Dr. Selman A. Waksman, Russian-born microbiologist at the New Jersey Agricultural Experiment Station, Rutgers University, discovered streptomycin as the re-



Graph from "Domestic Commerce"

Antibiotics — virtually all penicillin — account for one fifth of pharmaceutical exports for 1946.

sult of tests on the antibacterial activity of metabolic substrates of an innumerable number of soil organisms — molds and fungi.

The search for new antibiotics is a highly complex undertaking, as may be appreciated from an outline of the process. The isolation of antagonistic organisms, obtained from the microbiologic population of the soil, is carried out by plating soil on agar media containing washed, living cells of bacteria, and isolating the antagonistic organisms from the plates. The active antibiotic is isolated from the growing medium and then is concentrated and purified. The selection of a preferred antibiotic is largely governed by its toxicity to animals, its activity in the animal body, and its influence upon particular disease-producing bacteria; in other words, by its specific bacteriologic "spectrum." This activity is measured at various dilutions against a whole range of test organisms (bacteria) which are roughly designated as either Gram-positive or Gram-negative.†

Earlier experiments by Waksman's group had produced a mold-metabolite, streptothricin, obtained from *Actinomyces lavendulae*, which showed marked activity against Gram-negative bacteria, but proved too toxic for *in vivo* use. *Streptomyces griseus*, however, another organism of similar type, which is found in heavily manured field soil and belongs to the natural order known as *Actinomycetes*, proved equally effective in *in vitro* tests, and was shown by pharmacologists H. J. Robinson and his associates of the Merck Institute for Therapeutic Research to have low toxicity, *i.e.*, a favorable therapeutic index. At Waksman's suggestion, W. H. Feldman, H. C. Hinshaw, and D. H. Heilman of the Mayo Clinic initiated experiments on experimental tuberculosis in guinea pigs, which have since been translated into the field of human trials. The results of these investigations, while eagerly awaited, cannot be fully evaluated until treatment over long periods, involving huge quantities of the now still rather rare drug, has been carried out. Present observations indicate promise of at least arresting the disease in certain forms.

The usual method of administering streptomycin is by intramuscular or subcutaneous injection, but the drug lends itself to oral administra- (Continued on page 184)

† Gram-positive or Gram-negative bacteria are so called according to whether they react positively or negatively to a staining procedure devised by the Danish physician, Hans Christian Gram.

Vacuum in the Home

Based on the Nineteenth Century Carpet Cleaner and Street Sweeper, Today's Portable Household Vacuum Cleaner Awaited the Electric Motor for Its Widespread Popularity

BY SIGFRIED GIEDION

THE term "vacuum cleaner" did not come into use before the beginning of the Twentieth Century and probably not before 1903.¹ During the Nineteenth Century the only term in use was "carpet-sweepers." At the turn of the century heterogeneously named firms appeared in America, claiming to have solved the problems of mechanical cleaning by air suction. After the medium used, one enterprise called itself the Air Cleaning Company. Another's title, Sanitary Devices Company, stressed the elimination of flying dust and the hygienic aspect. Finally, a firm which acquired all the then basic patents,² took the name that was later to stand for the whole category, Vacuum Cleaner Company.

Toward the end of the 1850's a number of proposals were made to relieve backbending in carpet cleaning by means of devices to be rolled over the carpet at the end of a handle. The five carpet-sweeping patents granted in 1858 and the nine in 1859 laid down the basic types of mechanism. The solutions center around the idea that a cylindrical revolving brush³ caused to turn within a small chassis, mounted on wheels or rollers, brushes dirt from the carpet. Neither the drive nor the form of the device have undergone change of principle since the 1850's.⁴

¹ Quoting from the *Westminster Gazette* of May 30, 1903, the *Oxford Dictionary* shows how unfamiliar was the idea of cleaning by a void: "There is a machine at work, called the vacuum cleaner." The French speak at that time of a "nettoyage sanitaire par le vide." (*La Nature*, Paris, 1903, p. 576.)

² David T. Kenney, U. S. Patent 739263, September 15, 1903, and U. S. Patent 781532, May 28, 1904. Neither of these patents mention a vacuum cleaner; they speak of an "apparatus for removing dust."

³ The first patent for mechanical carpet-cleaners, U. S. Patent 21233, August 17, 1858, is based on "a revolving brush connected with driving wheels." The rotary brush first appeared in the street-cleaning machines in 1840. The second, U. S. Patent 21451, September 7, 1858, represents a "combination of a brush with a traction roller."

⁴ Cf. U. S. Patent 24103, May 24, 1859.

Revolving brushes were first used to clean the streets. Statements in the specialized literature to the effect that the street-sweeper with revolving brushes appeared almost at the same time as "its counterpart, the carpet-sweeper" should be discounted.⁵ Indeed the modern street sweeping-machine was invented by the English tool designer, Joseph Whitworth, as early as the 1840's.⁶ Its forerunners of the 1820's⁷ are extremely primitive. In one of these early examples, the brooms are mounted between two carrying wheels somewhat like the paddles of the water wheel.

But Joseph Whitworth's apparatus represented an example of precision machinery. He used an endless chain of brooms, driven by the axle of the cart. A master hand is seen in the way in which he broke with tradition to form a chain of open and closed links, the open links of which carry the brooms. Carried on the endless chain, the brushes raise the dirt up the inclined carrier plate and

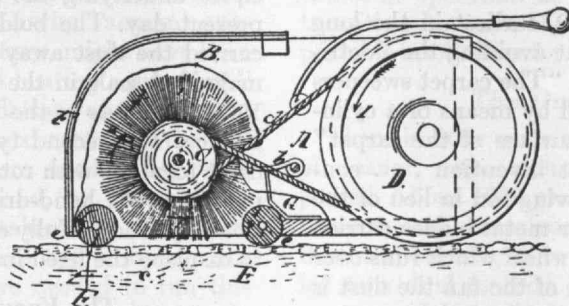
dump it into the container. Whitworth's street-sweeper, the first to perform the task mechanically on a broad scale, reveals in all its details the touch of the engineer who by the middle of the Nineteenth Century had brought machine building to a high level of precision.

It was no chance event that the first vacuum cleaner based on suction

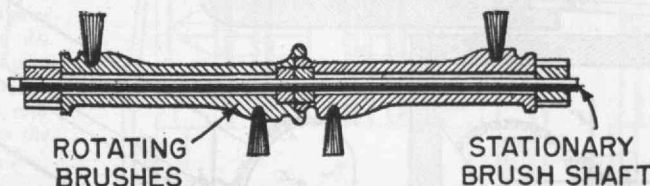
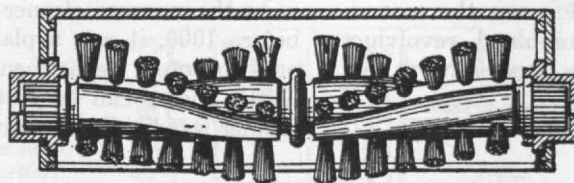
⁵ M. S. Cooley, *Vacuum Cleaning Systems*. (New York, Heating and Ventilating Magazine Co., 1913, p. 3.)

⁶ There are two patents. The first is the British Patent 8475 dated April 15, 1840, and entitled "Machinery for Cleaning and Repairing Roads and Ways;" the second, British Patent 9433 of August 2, 1842, was described as "Apparatus for Cleaning Roads." This is also the first American patent (U. S. Patent 3124, June 1, 1843) for street cleaning machinery. The Patent of 1840 includes, among other features, an early (perhaps the first) use of the large rotary brush which Whitworth calls a circular broom. It was driven by a crossed sprocket chain.

⁷ British Patent 5275, November 1, 1825.

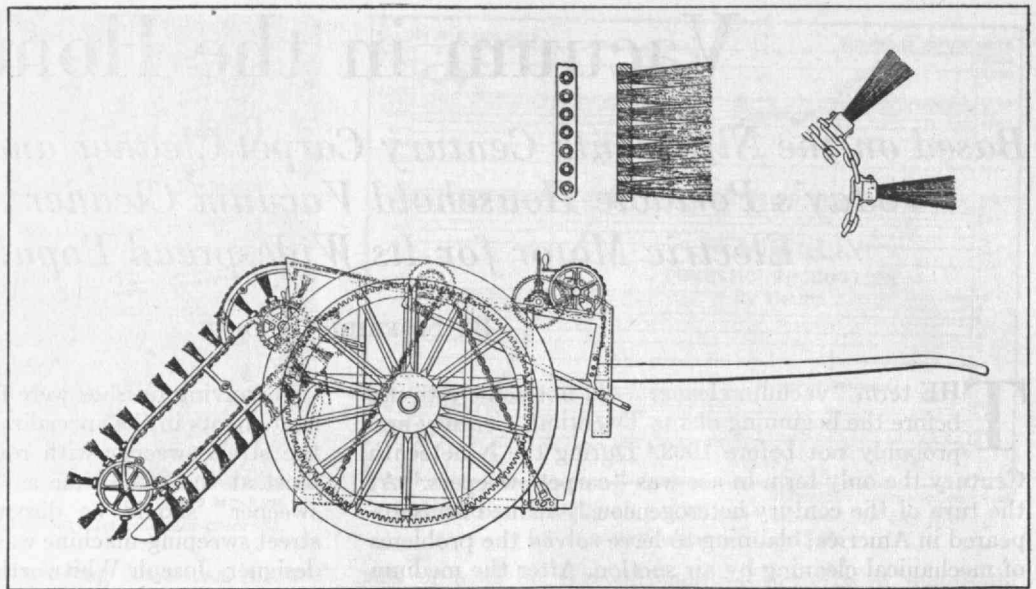


The origin of the vacuum cleaner may be traced to the development of street sweepers and carpet cleaners almost 90 years ago. A basic concept of early devices for cleaning carpets is the rotating brush, actuated as the mechanical sweeper was rolled over the carpet by hand, and described in a patent issued to H. Davis on May 24, 1859.



Front view (above) and section (below) showing the manner in which the brushes were arranged in the mechanical carpet sweeper patented in 1859.

In apparatus devised by Joseph Whitworth of England, the brooms for sweeping dirt from streets were carried on an endless chain to which they were affixed in rows by open links. Dirt was swept into an inclined container and deposited into a receptacle.



appeared in 1859. The period before our Civil War was an era in which were proposed many projects (often fantastic ones) exploiting the gases, air-pressure, or partial vacuum. Ideas based on the properties of gases — and ranging from the injection of carbonic acid into dough, to the Bessemer process, in which air was blasted through molten iron — were frequent, and these led to primitive proposals for using air suction to clean carpets. Following by a few months the first mechanical carpet-sweepers using brushes, there appeared a vacuum appliance whose wheels drove a four-bladed fan.⁸

This carpet fan sweeper of 1859, earliest in the long line of pure suction types, aimed at avoiding the “detrimental” effect of rotating brushes. “The carpet sweepers heretofore contrived have operated by means of a cylindrical brush in contact with the surface of the carpet” the inventor states. “My present invention . . . consists in the employment of a revolving fan in lieu of the brush.” The fan, consisting of four metal blades carried on a spindle, is highly geared to a wheel which runs over the carpet so that “by the motion of the fan the dust is blown into the pan and the carpet is cleaned even more perfectly than can be effected by a revolving brush.” The inventor is careful to stress that the fan is adjusted so as not to come in direct contact with the carpet. Thus the principle of the domestic vacuum cleaner based purely on suction was invented and clearly formulated by 1859.

Also formulated at this time (1860) was the second type of vacuum cleaner, which combined revolving brushes with a continuous draft.⁹ The brushes swept the

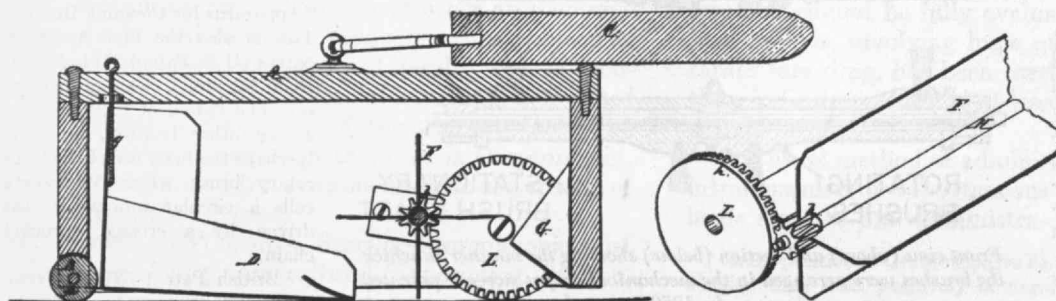
dust into a draft produced by bellows which are driven by a connecting rod attached to the wheels. In describing this device the inventor said: “The nature of my invention consists in drawing fine dust and dirt through the machine by means of a draft of air,” and (this suggestion is interesting at so early a date) “forcing the same into water or . . . anything else which will retain the dust.”

Let us anticipate and glance at what was to follow. These two appliances, that of 1859 and that of 1860, created the basic types, in which were embodied the principles underlying the whole development down to the present day. The bolder principle, that of 1859, which carried the dust away by suction alone, was used on a magnified scale in the fixed American installations after 1900 as well as in the mobile apparatus of England and France. The second type, that of 1860, which used air draft together with rotating brushes was continually improved in its hand-driven form during the Nineteenth Century. Successfully electrified after 1910, it then began to displace the fixed installations.

The Vacuum Cleaner of 1900

The portable machines were arrived at by a detour. Just as the electric motor had to pass through the gigantic before giving rise to a reliable small motor, so time was needed before the automatically powered vacuum cleaner could be reduced to a tool of convenient size.

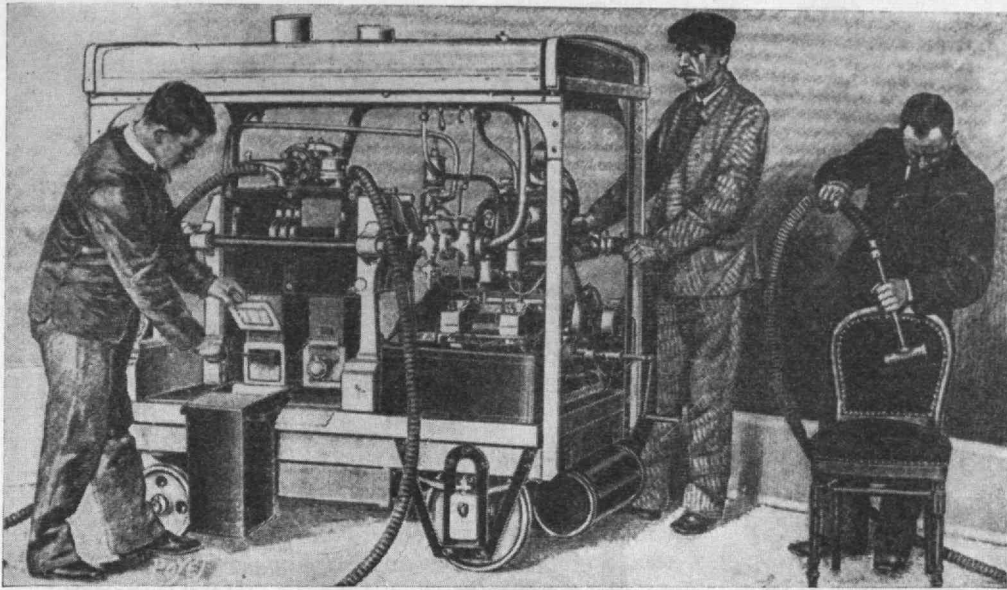
As the vacuum cleaner gradually took shape, shortly before 1900, it was a plant of considerable size, suited only to hotels, department stores, or railroad terminals. Three phases can be distinguished before the vacuum cleaner was finally introduced.



First attempt to produce a novel cleaning mechanism by partial vacuum and without the aid of brushes made use of a mechanically operated four-blade fan, F, which swept dust into the receptacle, D.

⁸ Carpet Fan Sweeper, U. S. Patent 22488, January 4, 1859.

⁹ U. S. Patent 29077, July 10, 1860.



Early methods of removing dirt by partial vacuum employed so much equipment that permanent installations were required. Mobile units (of which an example is given by the French installation of 1903, shown at the left), represented a transitional stage between the stationary installations and the portable machines later used in almost every home. Even mobile units were cumbersome affairs, requiring at least two men for their operation.

At first, carpets for cleaning were sent to special centers which were often connected with laundries. There, bulky carpet-beating machines were used, which imitated the human motions of an arm swinging a carpet beater. The first patents appear about 1860.¹⁰ Even after 1900 an English handbook on laundry management surveys the diverse carpet-cleaning systems without any mention of the vacuum cleaner.

Stationary installations within the building formed the second phase. Suction machines in the basements of large establishments were connected by pipelines to outlets throughout the edifice. This explains why vacuum apparatus, made at the turn of the century, might have been made by manufacturers of central heating equipment.¹¹ America was first to develop installations of this kind.

In the third phase, frequently coexistent with the second, mobile plants on wheels were used. They were moved from house to house by hand, by horse, or by motor. A long, flexible hose was taken into the apartment from the street or court where the pumping unit was parked. At least two men were needed to run this outfit — one to look after the machinery, another to do the cleaning.

¹⁰ Three patents for carpet beating machines were taken out in 1860: U. S. Patents 27730, 28389, and 30590.

¹¹ *Laundry Management, a Handbook for Use in Private and Public Laundries*, 4th edition (London, 1902), Chapter 23, Carpet Beating.

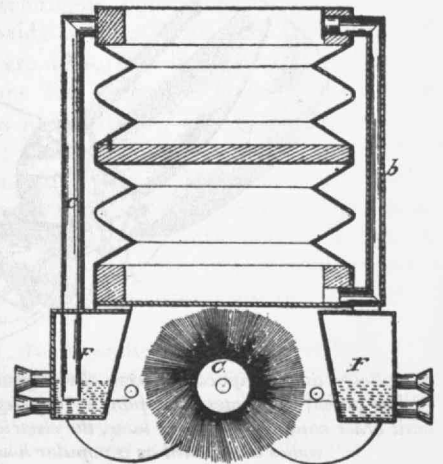
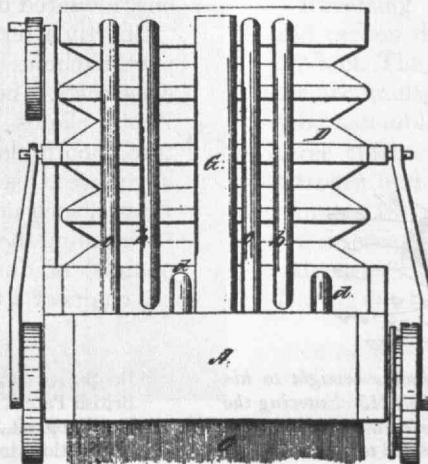
Such mobile plants were developed by the French and especially by the English. H. C. Booth, inventor of what the English claim to be the first satisfactory vacuum cleaner, recalls his experiences in the early days, between 1901 and 1903: "It was assumed by the police authorities that the machine had no right to work on a public thoroughfare . . . The Vacuum Cleaner Company was frequently sued for damages for alleged frightening of cab horses in the street."¹² The mobile units were soon reduced in size and the French had moderate sized machines in operation at an early date. They represent a transition between the large stationary plants and the portable appliances for use in the private home.

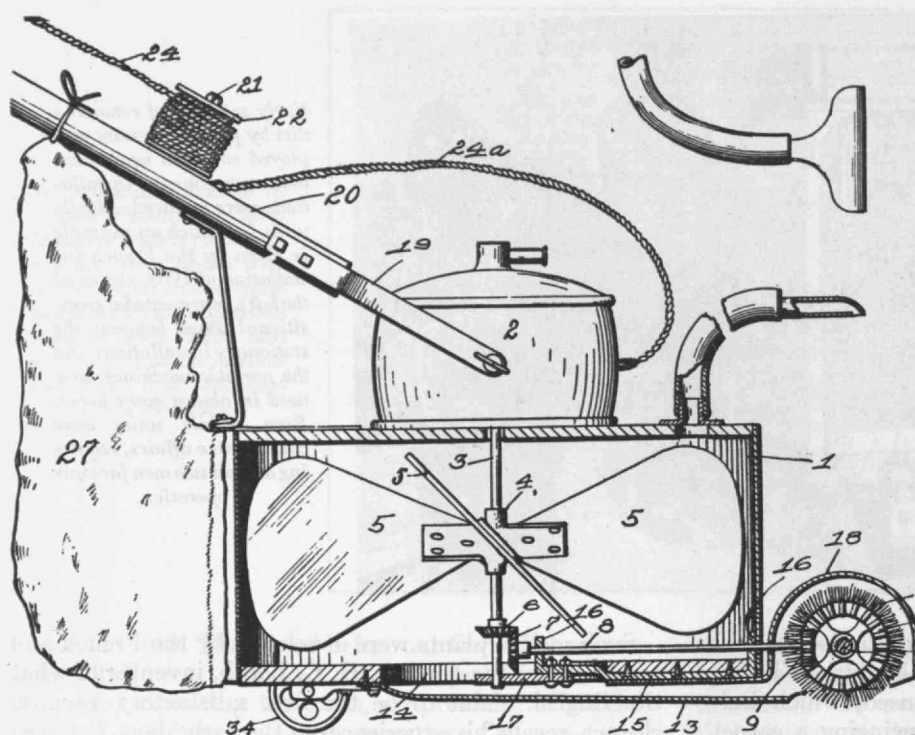
The Question of Origins

There is little certainty as to where the modern type of cleaner, with mechanically created suction, first appeared. About 1900 practice wavered between the use of vacuum and compressed air — between sucking up the dust and blowing it away. The uncertainty occasionally led to a dual method employing a complex mixture of compressed air and vacuum. The forerunner of the vacuum cleaner was the compressed air cleaner used in foundries to blow dust from castings. The first use in cleaning buildings, we are told, "was undoubtedly in the

¹² H. C. Booth, "The Origin of the Vacuum Cleaner" (*Newcomen Society Transactions*, London, 1936), v. 15, p. 93.

A patent of 1860 marks the first use of both rotating brushes and partial vacuum for the removal of dirt from carpets. The partial vacuum was produced by means of a bellows, D, actuated as the mechanism rolled over the carpet. Dirt loosened by the brush, C, was removed by the bellows, D, and deposited through tubes, E, into the water filled collector receptacle, F.



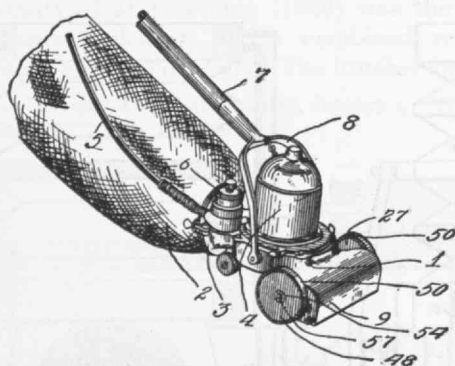


Prototype of the modern vacuum cleaner designs was described in a patent issued to James M. Spangler on June 2, 1908. Motive power for the fan blades, 5, and the rotating brush, 9, was provided by an electrically driven motor, 2. Dirt was deposited in a dust bag, 27, and for convenience of operation, the handle, 20, swivelled from the motor frame. Presumably the device was also intended to clean other household articles, as is indicated by the hose attachment at the upper right.

form of an open jet for dislodging dust from carvings.”¹³

American machines which blew air into the carpet were also demonstrated to the public of other countries. In one of the few references to himself, the Englishman Booth recalls: “My attention was first directed to the mechanical removal of dust from carpets in 1901 through a demonstration of an American machine by its inventor.

¹³ M. S. Cooley, *op. cit.*, p. 4. Again we learn from Joseph H. Young, Vice-president of the Westinghouse Air Brake Company, that when superintendent for the Union Pacific at Salt Lake City 1892-1893, he and David Patterson, master mechanic of the Union Pacific, sought to improve the manner of cleaning the car interiors. They coupled together a number of air-brake pumps in an effort to blow away the dust. When this proved impracticable they worked out a siphon method which sucked air up a hose and blew it out of the window. This was so successful that it was generally adopted by the Union Pacific for the cleaning of coaches and Pullman cars at its various passenger terminals. At the same time they developed a nozzle to spray paint on the outside of freight cars and wooden buildings. Although this procedure was taken over for the painting of ships, a patent application was denied on grounds that the principle conflicted with earlier patents for kindling fires in locomotive fire boxes by blowing oil from a tank by compressed air.



Simplicity and compactness were the improvements brought to his earlier patent by James M. Spangler in August 1915. Entering the mail order catalogs two years later, the electric vacuum appliance becomes established as a popular household tool.

... The machine consisted of a box to which compressed air was supplied; the air was blown down in the carpet from two opposite directions.”¹⁴

As we see, it is hard to ascertain where a satisfactory vacuum cleaner first came into being. The English name H. C. Booth as the inventor of the first machine operating exclusively by suction. His device was patented in 1901¹⁵ and was successfully introduced. Having been stimulated by demonstrations of these American machines which blew air into the carpet, the inventor claims as his own the idea of using suction alone. Booth suggested that the Americans try blowing in the opposite direction, and he made “the experiment of sucking with my mouth against the back of a plush seat in a restaurant on Victoria Street, with the result that I was always choked.”¹⁶ There is no doubt but that Booth made his invention independently, not finding out until later that a long series of Nineteenth Century patents had travelled the same path. In his reminiscences upon *The Origin of the Vacuum Cleaner* he gives an interesting enumeration of early patents. Booth’s machine of 1901 was a mobile one, mounted on a pushcart.¹⁷

Shortly after 1900 the French, too, were building compact machines driven by electric motors and mounted on wheelcarts. They claim the invention of a nozzle (which Booth claims as his) for use in cleaning their furniture. Booth claims, moreover, to have been the first to introduce this combination of hose and handle. In France, such machines seem to have been originally used for cleaning theater seats. As much as 217 kilograms (478 pounds) of dust are said to have been removed from the chairs of a theater¹⁸ in a single cleaning operation.

(Continued on page 176)

¹⁴ Booth, *op. cit.*, p. 85

¹⁵ British Patent 17433, August 30, 1901.

¹⁶ Booth, *op. cit.*, p. 86.

¹⁷ Illustrations in Booth, *op. cit.*, Plate XI.

Progress in Low Temperature Refrigeration

Gasoline from Natural Gas Is One By-Product of Low Cost Oxygen Which Is Made Possible by Research in Low Temperature Refrigeration

By S. C. COLLINS

A LOW pressure oxygen generating system which was initiated and largely developed at the Massachusetts Institute of Technology during the war is finding extensive application in our post-war economy. Installations planned for the immediate future will more than double the production of oxygen in the United States. This phenomenal expansion is the result of the substantial reduction in cost of production which the new equipment has effected. Low-cost oxygen finds new industrial uses which demand quantities of a magnitude unheard of so long as welding, cutting of steel, and breathing were its chief applications.

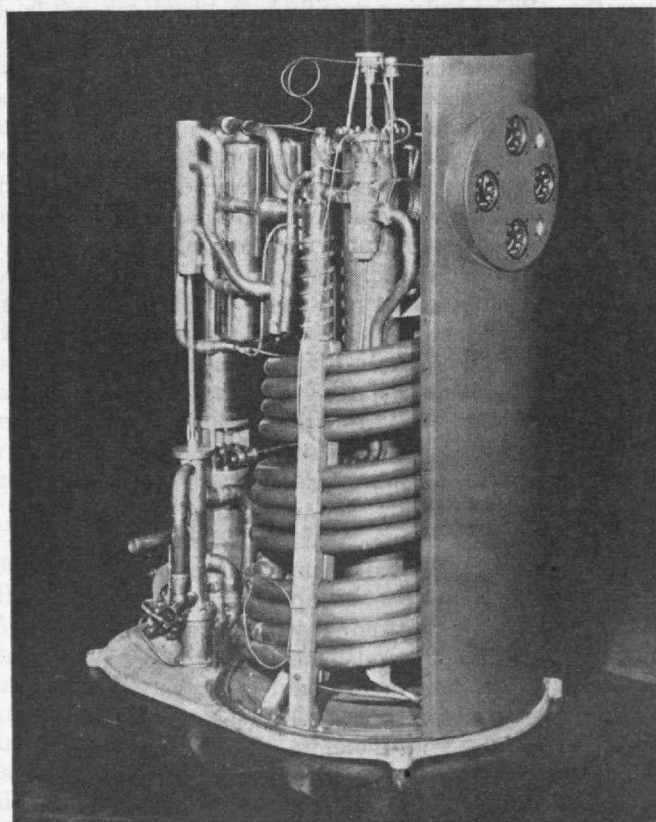
Since the beginning of the Twentieth Century, the preparation of commercial oxygen from air by distilling liquefied air has passed from the experimental stage to large-scale production, but the equipment for production in use at the present time is substantially identical with that devised by Linde and Claude 40 years ago. Air is

compressed (500 to 3,000 pounds per square inch), freed of carbon dioxide and water by treatment with chemicals which unite with or absorb them, cooled to a very low temperature in a counter flow heat exchanger by loss of heat to cool streams of nitrogen and oxygen flowing in the opposite direction, condensed in the base of the rectifying column by the evaporation of liquid oxygen at low pressure and finally resolved into its pure components in the column. The refrigeration required to maintain operating conditions is supplied by the Joule-Thomson effect in the Linde process. In Claude's method, the Joule-Thomson cooling is augmented by allowing the expansion of the compressed air to occur in an engine which performs useful external work.

Since water and carbon dioxide freeze at temperatures far above the boiling point of liquid air, they must be fairly completely removed. Methods other than chemical treatment for purifying air have been tried and have been found unsatisfactory for one reason or another. The most successful was the substitution of two pairs of cold accumulators¹ or regenerators for the counter flow heat exchanger. In the cold accumulators, condensible impurities are frozen out of the air and later carried away by the nitrogen and the oxygen. The oxygen, however, is badly contaminated with air.

The distinguishing features of the M.I.T. oxygen system are the reversing exchangers² which achieve mechanical purification and the highly efficient flexible rod expansion engine³ which has made practicable operation at 85 to 150 pounds per square inch. Their development was part of an extensive study of oxygen problems sponsored by the National Defense Research Committee and by the Aero Medical Laboratory of Wright Field.

Reversing exchangers completely remove the water and carbon dioxide without impairing the purity of the product. They are also much lighter and less bulky than the accumulators. The exchanger consists of a number of tube assemblies in parallel — each assembly containing three channels; one for compressed air, one for waste nitrogen and one for oxygen. At intervals of about four minutes the compressed air and waste nitrogen channels are interchanged by the automatic action of the switch valves, as shown in the diagram of the oxygen generator. During one half-cycle, impurities freeze out upon the walls

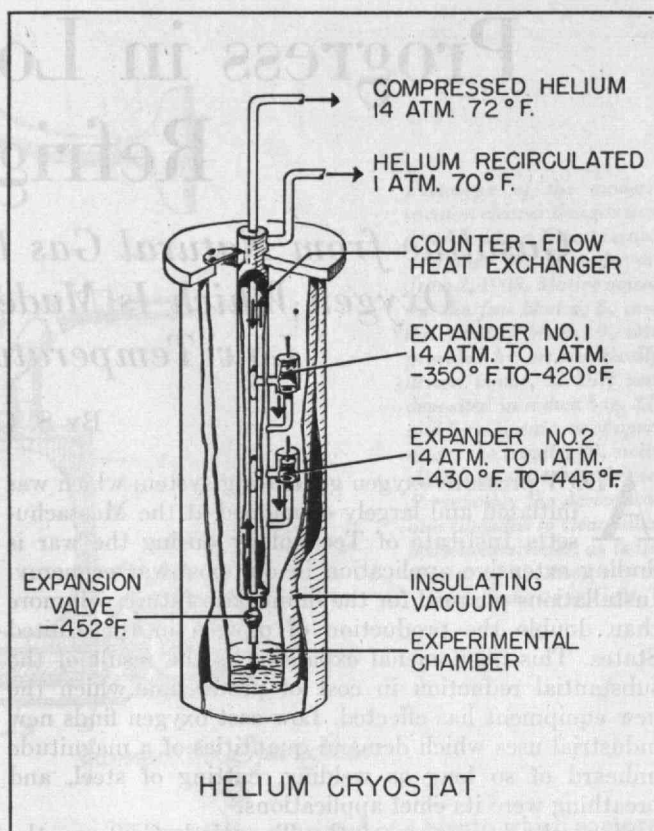
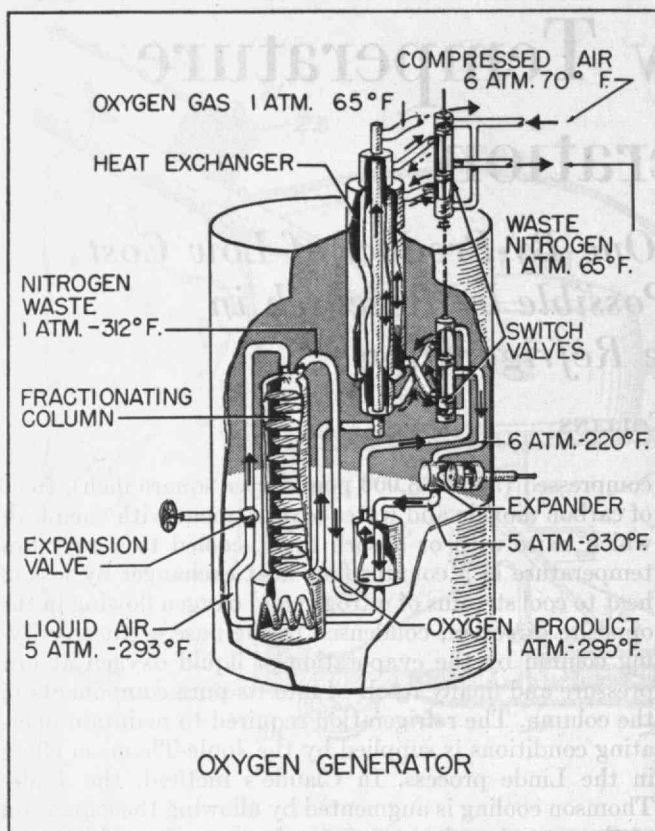


Photograph of small oxygen generator, a schematic diagram of which is shown on the next page

¹ Ruhemann, M., *The Separation of Gases* (Oxford Press 1940).

² Collins, S. C., "Reversing Exchangers for Purifying Air." Scheduled for publication in the December 1946 issue of *Chemical Engineering*.

³ Collins, S. C., "A Helium Cryostat." Scheduled for publication in the January 1947 issue of *Review of Scientific Instruments*.



of the channel carrying compressed air. During the next half-cycle, waste nitrogen flows in the opposite direction through the particular channel and the impurities evaporate into the nitrogen stream. The heat exchanger may thereby be used indefinitely without clogging.

Improvements in expansion devices for cooling by the performance of external work have been made. Flexible rod expansion engines with nitrided steel pistons and cylinders operating with slight clearances, without piston rings and without lubricant other than gaseous air, have shown unusually high efficiency. Elsewhere turbo-expanders for large installations have been developed.

With the improvements described above, it is possible to operate large plants on raw air at 85 pounds per square inch. The power cost of gaseous oxygen at low pressure is simply the cost of compressing atmospheric air, from which it is made, to 85 pounds per square inch. Operational hazards, a serious matter in all plants of the Linde and Claude types, are substantially reduced in the M.I.T. system. The reversing exchangers are so effective in capturing condensable impurities that hydrocarbons from the lubricating oil used in the compressor do not concentrate in the column. Acetylene and methane, however, must be kept away from the air supply.

Applications in which low-cost oxygen consumption is expected to become important are the production of gasoline from natural gas, blast furnace and other metallurgical operations, and the gasification of low grade fuels.

The Function of Low Temperature Research

Aside from the satisfaction of gaining more knowledge about the behavior of matter in a new environment, definite gains in understanding basic physical principles have been achieved from low temperature research. Extensive measurements of specific heats of a great

variety of substances over the attainable temperature range, together with known constants of chemical equilibrium, have provided abundant verification of the principle that the entropy of stable chemical substances may be considered to be zero at the absolute zero of temperature. By measuring specific heats down to very low temperatures, latent heats of fusion, vaporization, and transition, as well as heats of reaction, one can evaluate the entropy of substances at other temperatures. Since the thermodynamic relationship between the equilibrium constant of any chemical reaction, the entropy of substances taking part in the reaction, and the heat of reaction is accurately known, it is possible to determine from calorimetric data alone, the best operating conditions and yield that can be expected.

The mass of data that now exists at low temperatures concerning thermal and electrical conductivities, magnetic susceptibility, and so on, has served to complete our understanding of certain classes of phenomena; it has also created new mysteries which clamor for solution. Notable discoveries are the superconducting state and the abnormalities of liquid helium II, the name applied to liquid helium below the transition temperature of 2.18° K at which the peculiar behavior sets in. Under certain conditions, liquid helium II climbs the wall of its container, goes over the lip and down the outside, and drips from the bottom. It will flow uphill through a capillary or through porous material in the presence of a temperature gradient in the right direction. Many substances lose their electrical resistance at very low temperatures and are said, therefore, to be superconducting. An electric current set up by induction in such a conductor continues to flow as long as the proper temperature level is maintained. The magnitude of the current is limited to fairly small values, however, (*Continued on page 188*)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Honors

THE Medal of Freedom, which is awarded by the War Department for exceptionally meritorious achievement during the war, was presented to Dr. Edward L. Moreland, Executive Vice-president of the Institute and Deputy Dean of Engineering, and to Dr. George R. Harrison, Dean of Science on December 3 in a ceremony in Dr. Harrison's office. The medals were presented to Dr. Moreland and Dr. Harrison by Major Douglas McKillop of the Adjutant General's Office.

The citation accompanying the award to Dr. Moreland stated that as Chief of the Scientific and Technical Advisory Committee, General Headquarters, United States Army in the Pacific from August to November, 1945, he "ably organized the facilities, personnel and equipment to handle many scientific and technical problems. With the surrender of Japan, he speedily and efficiently formed a group of specialists to secure data on Japanese technical research facilities and accomplishments before it could be destroyed. Through his skill and ability, Dr. Moreland contributed notably to the preservation of valuable records and information and to the study of Japanese research and developments."

Dr. Harrison's citation stated that "as organizer and Chief of the Southwest Pacific section of the Office of Field Service from March to July 1944, he contributed materially to the application of the weapons of science against the enemy and forces of nature confronting troops in Pacific areas. He served with marked ability in connection with the moisture and fungus proofing of electronic equipment, the modifying of light weight radar equipment for island warfare, the investigation of radio wave propagation characteristics under tropical conditions, and the development of electronic navigational aids, all of which activities were contributions of unusual importance to ultimate victory in the Pacific."

Members of the administrative staff who attended the ceremony included Dean John W. M. Bunker, Dean Thomas K. Sherwood, Dean William W. Wurster, Professor John E. Burchard, Captain William H. Buracker, Colonel Harold R. Jackson and Robert M. Kimball.

Henry H. W. Keith — 1879-1946

PROFESSOR Henry H. W. Keith, who retired as Head of the Department of Naval Architecture and Marine Engineering, on January 1st, 1946, died on December 3rd. He was 67 years old.

Professor Keith's association with the Institute began as a student in 1901, and for five years after his graduation in 1905 he was engaged in research at the United States Experimental Model Basin at the Navy Yard in Washington, where he worked under Rear Admiral David W. Taylor.

His teaching career at the Institute, which began in 1910 when he was appointed instructor in naval architec-

ture, was interrupted at the time of World War I, by active service as lieutenant commander in the Construction Corps of the United States Naval Reserve. At the time of his enlistment he was Assistant Professor of Naval Architecture. Thereafter he served as Associate Professor from 1922 to 1928, becoming a full Professor in 1928. In 1937 he succeeded Professor James R. Jack as head of his department.

Professor Keith was a member of the Society of Naval Architects and Marine Engineers, the American Society of Naval Engineers, the United States Naval Institute, the North East Coast Institution of Engineers and Shipbuilders of England, the Military Order of the World War, the Naval Order of the United States, and Sigma Xi.

Appointment

THE appointment of R. Colin Maclaurin as Personnel Officer of the Institute, has been announced by President Compton.

Son of the late president of the Institute, Dr. Richard C. Maclaurin, and a graduate of Harvard University, Mr. Maclaurin comes to the Institute after serving in the United States Navy for three years as Assistant Industrial Relations Officer at the Boston Navy Yard. Prior to entering the service, he had industrial relations experience at the John P. Squire Company and the Fore River Shipyard.

Annapolis to M.I.T.

VICE Admiral Edward L. Cochrane, Chief of the Material Division of the United States Navy, and former Chief of the Bureau of Ships, has been appointed head of the Department of Naval Architecture and Marine Engineering at M.I.T. and Commander E. C. Holtzworth, U.S.N. has been named Professor of Naval Construction in the same Department, according to announcements recently made by President Compton.

Succeeding the late Professor Henry H. W. Keith, '05, who retired last January after serving 35 years on the Institute's staff and whose death is recorded on this page, Admiral Cochrane will assume his new duties early in 1947. Commander Holtzworth succeeds Professor Charles P. Wheelock who was promoted to the rank of Rear Admiral and named Deputy and Assistant Chief of the Bureau of Ships on November 1.

Chief of the Bureau of Ships from November 1942 until his appointment to the post of Chief of the Material Division, Admiral Cochrane is the son of Brig. Gen. Henry Clay Cochrane of the United States Marine Corps and Elizabeth (Lull) Cochrane. After studying at the University of Pennsylvania from 1909 to 1910, he entered the United States Naval Academy, was graduated with distinction in 1914 as an ensign, and advanced through the grades to his present rank in 1945. He carried on post graduate work at the United States Naval Acad-

emy until 1916, and was then sent to M.I.T. for further advanced work in naval construction for which he was awarded the degree of master of science in 1920. Admiral Cochrane attended the United States War College in 1939.

From 1917 to 1919 he was assigned to the Philadelphia Navy Yard, after which he came to M.I.T. for his graduate work and returned to Philadelphia, where he remained from 1920 to 1924, first in charge of construction of two battle cruisers, and later in charge of repairs. From 1924 to 1929 he was assigned to the Bureau of Construction and Repair of the Navy Department, specializing in submarine and general ship design.

In 1929 Admiral Cochrane was technical advisor to the United States Delegation of the International Conference on the Safety of Life at Sea, which was held in London. He was in charge of design and construction of submarines at the Navy Yard at Portsmouth, N. H., 1929 to 1933, when he was assigned as the Force Constructor on its Staff and was Commander in the Scouting Force of the United States Fleet from 1933 to 1935. From that year until 1939 he was in charge of contract design, and from 1939 to 1940 he served as assistant to the head of the Design Division of the Bureau of Construction and Repair. It was in 1940 that Admiral Cochrane was appointed Naval Attaché at the American Embassy in London and a year later he was assigned to the post of Hull Assistant to the Head of the Design Division of the Bureau of Ships, where he served until his appointment as Chief of the Bureau of Ships in 1942.

Admiral Cochrane was awarded the Mexican Campaign Medal in 1914, the Victory Medal, World War I in 1919, and the American Defense Medal in 1942. He holds the Asiatic-Pacific Campaign Medal, which he was awarded in 1944, and the American Theatre Medal as well as the Victory Medal, World War II, both awarded in 1945. The David W. Taylor Gold Medal for notable achievement in Naval Architecture and Marine Engineering was awarded to Admiral Cochrane in 1945, when he was also made a Knight Commander, Military Division, of the Order of the British Empire. The Navy bestowed upon him in 1946 its Distinguished Service Medal.

Admiral Cochrane holds the honorary degree of Doctor of Laws from Hahnemann Medical College, conferred in 1943, and the honorary degree of Doctor of Engineering which was awarded by Brooklyn Polytechnic Institute in 1946. He is a member of the National Academy of Sciences, the Society of Naval Architecture and Marine Engineering, the American Society of Naval Engineers, the British Institution of Naval Architects, the United States Naval Institute and the American Branch of Newcomen Society of England.

Upon graduation from the U. S. Naval Academy in 1931, Commander Holtzworth was assigned to the light cruiser, USS *Omaha*, for two years before being selected for a course in naval construction at the Institute which he attended from 1933 to 1936, graduating with the degree of Master of Science.

His first assignment to duty as a naval constructor was at the Norfolk Naval Shipyard where, as a superintendent of shipbuilding, he was assigned to experimental work. For two years of his tour of duty at Norfolk he was also on the staff of the University of Virginia conducting an extension course in naval architecture.



Vice Admiral Edward L. Cochrane, Chief of the Material Division of the United States Navy, will assume new duties as head of the Department of Naval Architecture and Marine Engineering

His next assignment, for a period of three years, was the Pearl Harbor Navy Yard where as Design Superintendent he was in charge of the engineering and design organization of the Yard. While in Hawaii he was associated with the University of Hawaii for a period of two years as a lecturer in naval architecture and marine engineering.

Shortly after the start of World War II he was ordered to duty in the Bureau of Ships of the Navy Department in Washington, D. C. He was assigned to the Ship Design Branch of the Bureau as Head of the War Damage Analysis Group. This work has given Commander Holtzworth a most complete picture not only of the affectiveness of the designs of existing men-of-war, but especially qualifies him to help shape the future trends in the design and construction of men-of-war.

Additional duty was assigned to him as technical advisor to the amphibious forces in the Pacific Fleet with reference to the operation and employment of amphibious vessels in assault landings. When the war ended, he was assigned for four months to the Naval Technical Mission to Japan.

Bikini Bound

UNUSUALLY high attendance marked the 252d meeting of the Alumni Council which held its first meeting of the season at 6 P.M. on October 28, in Pritchett Hall of Walker Memorial. As first order of business after the 149 members and guests finished dinner, President Harold Bugbee, '20, introduced new faculty members, class representatives and officers, and Alumni Council representatives and alternates. The minutes of the Council meeting of May 27 were approved. President Bugbee presented a report of the action of the Executive Committee at its special meeting on October 17, in which

Dean H. E. Lobdell, '17 was elevated to the new post of Executive Vice-president of the Alumni Association, an honor to which the Alumni Council gave its unanimous endorsement.

Charles E. Locke, '96, Alumni Secretary, next presented his report which recorded recent actions of the Executive Committee. It was announced that Parke D. Appel, '22 will serve as chairman for Alumni Day which will be Saturday, June 14, 1947. Since the last meeting of the Council at the end of May, visits by members of the Institute's faculty and staff have been made to 10 local M.I.T. clubs. As chairman of the Committee to Nominate Representatives of Local Associations, E. J. Whitcomb, '11, recommended the names of 12 new representatives, and changes in the representation of 10 alternates. Votes of acceptance were given reports presented by Ralph T. Jope, '28, Alumni Treasurer, from H. B. Kane, '24, Alumni Fund Director, and from William L. Campbell, chairman of Alumni Day, June 1946.

President Bugbee then called on Louis B. Baldwin, Jr., '48, who gave a brief account of Freshman Camp activities which were held at the Salvation Army's Camp in Sharon just before the opening of the present school term. Mr. Baldwin reviewed briefly the history of Freshman Camps, included their restricted operation during the war, and gave a résumé of the program at Sharon Camp attended by a record number of students.

The feature of the evening came when President Compton was invited to recount his interesting experiences at Bikini during the summer. Dr. Compton responded by giving a vivid account of his personal experiences of Able Day and Baker Day in the Bikini atom bomb tests and by outlining the destruction which had been wrought. The talk was illustrated with slides as well as with sound pictures in color made by the Navy. The stimulating address and the instructive pictures which were shown led to a long discussion period in which Dr. Compton answered many questions of a most appreciative audience.

Science, Government and Industry

SIR Edward V. Appleton, distinguished scientist of Great Britain and Secretary of the British Department of Scientific and Industrial Research, delivered the inaugural lecture at M.I.T. on the evening of November 19 under the Arthur Dehon Little Memorial Lectureship. The lectureship was established in memory of Arthur D. Little, '85, by the engineering firm which he founded and which bears his name. Its broad purpose is to promote interest and stimulate discussion of the social implications inherent in the development of science through lectures by distinguished contributors to the advancement of science. In keeping with the objectives of the lectureship, Sir Edward spoke on "Science, Government and Industry" in his lecture, open to the public, in Morss Hall, Walker Memorial.

As head of his department, an agency of the British Government, Sir Edward since 1939 has directed research in natural science and its applications to all industrial processes, except in the fields of medicine and agriculture, a task which involved the activities of eight major national laboratories in Great Britain. He is also scientific advisor to the Crown.



Sir Edward V. Appleton, Secretary of the British Department of Scientific and Industrial Research, inaugurated the Arthur Dehon Little lectures with an address on "Science, Government and Industry"

The activities of the Department of Scientific and Industrial research which operate under the Lord President of the Privy Council, began in 1916, and its divisions include building, forest products, fuel, roads, and water pollution, as well as the geographical survey. Its contributions to research and development during the war were particularly notable and its present program includes the major problems of reconstruction and rehabilitation in England.

One of the problems in which Sir Edward is particularly interested and to which much attention is now being given in England is research for small companies which are not large enough to afford laboratories of their own, yet whose progress is to a large degree dependent upon technical investigations leading to improvements in products or the development of entirely new ones.

Sir Edward Appleton was born in England in 1892, and is a graduate of St. John's College, Cambridge, in which he was a distinguished scholar in physics. He served as a captain in the Royal Engineers in the first world war and later as assistant demonstrator in experimental physics at the Cavendish Laboratory, sub-lector at Trinity College, Wheatstone Professor at King's College, University of London, and finally Jacksonian Professor of Natural Philosophy at Cambridge University.

Sir Edward's chief scientific work, for which he earned an international reputation, has been the study of the electrical properties of the upper atmosphere. In 1925 he proved the existence of ionized layers in the upper atmosphere from which radio waves are reflected.

Out of the techniques which he devised for probing the ionosphere came the principle of radio-location. His distinguished scientific discoveries led to an understanding of the principle of propagation of radio waves that

has made it possible to predict the best frequencies for radio transmissions in any part of the world at a given time.

Sir Edward was elected a fellow of the Royal Society at thirty-five and he was awarded the distinguished Hughes Medal of the Society in 1933. In 1929 he was awarded the Morris Liebmann Prize. He is President of the International Scientific Radio Union, and is a past Chairman of the British National Committee for Radiotelegraphy. In 1932 Sir Edward was elected Vice-president of the Institute of Radio Engineers.

Although Sir Edward's work as head of his department is chiefly administrative, he still directs a research team which is carrying out further research on the ionosphere and problems of radio communication.

Arthur Dehon Little, for whom the memorial lectureship was established by the research organization of which he was the leader for so many years, died in 1935. He was internationally known as a pioneer in the application of science to industry. In 1893 he made notable contributions in the field of the chrome tanning process. His studies of the production of artificial silk led to important advances in 1894, and a year later he did significant work on carbon filaments. He was also widely known for the development of water-proof papers, wood waste utilization, methods of producing alcohol, casein products, electrolytic production of chlorine and soda, as well as hypochlorites and chlorates.

Dr. Little was graduated from the Massachusetts Institute of Technology in 1885 and his unfailing interest and training of young men in the advanced study of chemical technology was an important influence in the establishment of the research laboratory of applied chemistry as well as the chemical engineering practice school at M.I.T. He served two terms as president of the American Chemical Society and was president of the American Institute of Chemical Engineering and of the British Society of Chemical Industry. The University of Manchester conferred upon Dr. Little the degree of Doctor of Science in 1929 and the Manchester College of Technology made him an honorary Associate. In 1931 he received the distinguished Perkin Medal award which took cognizance of his influence in establishing chemistry as one of the most important factors in industrial progress.

WMIT, the Beaver Network

BY PAUL ELY, JR., '47

A NEW student activity was launched at 8 P.M. on November 25 when Dr. Karl T. Compton made the inaugural address at the opening of the Institute's first student broadcasting station, WMIT, of the Beaver Network. In commenting on the educational opportunities which the new student activity made possible, President Compton also mentioned some of the difficulties of operating a broadcasting service for students at M.I.T.

With headquarters, studio, and control room in Ware Dormitory, the station will provide regular programs to Technology students during the school year. WMIT operates on the carrier current principle in which the 110-volt power line acts as the medium for distributing the programs as well as the source of electric power. The distance over which signals may be picked up does not extend beyond 20 or 30 feet from the power lines to which the transmitter is coupled. The range is, consequently,

so small that no radio license is required and hence this student activity does not come under the jurisdiction of the Federal Communications Commission. At the same time, within the service area of the station which now includes the student dormitories, Walker Memorial and the President's House, programs may be received on any radio broadcast receiver tuned to the station's frequency of 800 kilocycles per second.

WMIT was organized early in October by a group of students headed by Henry Koerner, VI, '47 who now serves as Station Manager, Jack Page, II, '48, Advertising Manager, Paul Ely, Jr., XV, '47, Business Manager, Harold Jacobson, VI, '46, Program Director, Michael Rosar, VI, '47, Technical Manager, Albert J. Davidson, I, '47, and Harold B. Nelson, VI, '48. Together they pooled financial resources and purchased the items necessary to build the transmitter. Grants from the Institute Committee, the Dormitory Committee, and the M.I.T. Administration have made possible the repayment of most of these loans and, by the end of the year, the station's operations should make possible all debt retirement.

The station is operated on a strictly business-like basis, similar to that of commercial broadcasting stations. A constitution was drafted for the student government of the network and was approved by the Institute Committee. Applications for student participation were distributed, and interested students were interviewed and assigned to work in the engineering, program production, advertising, or business departments.

A poll of students living in the dormitories, taken by the business department, showed that the largest percentage of students preferred classical music, with popular music, news of campus activities, lectures, debates and sports receiving support in the order given. In accordance with the results of this poll, the station is operated Monday, Wednesday and Friday evenings between 8 P.M. and midnight.

The station's equipment was built in the Hobby Shop and in the Machine Tool Laboratory by interested students, many of whom had their training in radio during the war or as students in electrical engineering.

Although the coverage at present is limited to students in the dormitories, planned expansion will enable the station to serve the Graduate House, Westgate, and possibly the Dormitory Annex, a temporary structure built for research during the war and now converted into student living quarters. Telephone lines carrying signals will connect the studio with these outlets and a small, remotely controlled transmitter will broadcast these signals in outlying areas. Thus all of the student body living on M.I.T. property on the Cambridge side of the Charles River will be served by WMIT.

Also contemplated is a hook-up with WHCN, the Harvard Crimson Network, in which audio signals will be sent over telephone lines to Harvard where they will be sent over the Crimson's transmitter to both Harvard and Radcliffe students. An interchange of programs between the three colleges will thus be facilitated. It is hoped that other colleges in the Boston area can join this network. WECB at Emerson College plans to join, as does also the Wellesley station. Finally, we look forward to the formation of a Boston collegiate network whose finances and management will be in the hands of representatives from the student networks at each of the colleges in the Boston area. *(Continued on page 168)*

Why there are so many REVERE METALS

THERE are so many Revere Metals because no one metal can possibly fill all requirements. For high electrical and heat conductivity, for example, the coppers are supreme, but where heat conductivity *plus* extra strength is required, as in condensers and heat exchangers, alloys such as cupro-nickel or Admiralty metal may be required. Special corrosive conditions likewise may affect the choice of metal. When weight is a factor, as in anything that must be moved by mechanical or manpower, there are Revere aluminum and magnesium alloys. If fabrication costs are an important element, copper in one of its several types will be selected for some products, free-cutting brass rod for screw machine work, brass sheet and strip for severe forming operations, Herculoy for the corrosion resistance of copper with strength of mild steel plus ready weldability. Seldom, however, is there only one factor to be considered in selecting a Revere Metal; usually there are several, and striking the correct balance may not be easy. In such cases, Revere is glad to offer the cooperation of its Technical Advisory Service.

Revere Metals are offered in the form of mill products, as follows: *Copper and Copper Alloys:* Sheet and Plates, Roll and Strip, Rod and Bar, Tube and Pipe, Extruded Shapes, Forgings. *Aluminum Alloys:* Tube, Extruded Shapes, Forgings. *Magnesium Alloys:* Sheet and Plate, Rod and Bar, Tube, Extruded Shapes, Forgings. *Steel:* Electric Welded Steel Tube.

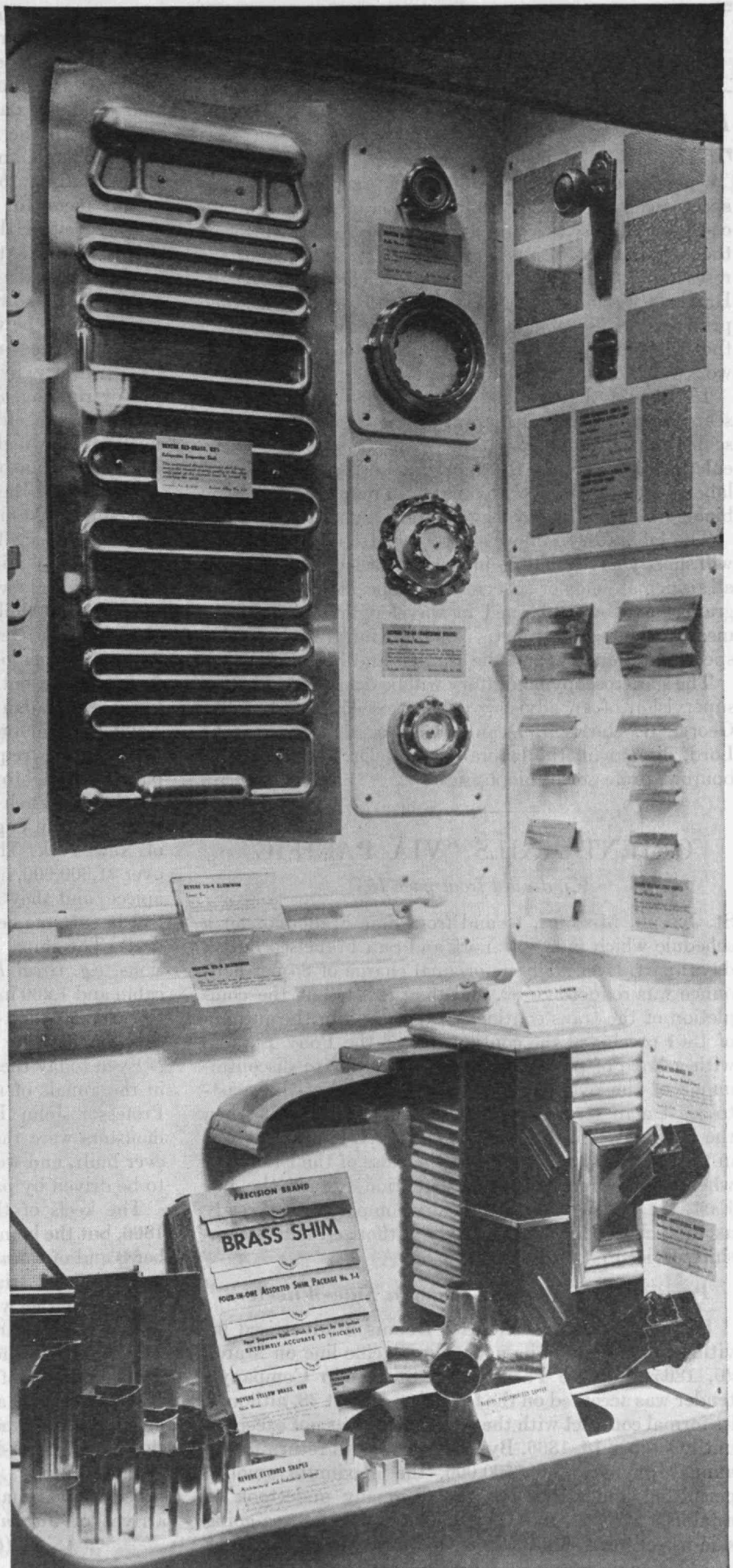
REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Ave., New York 17, New York
Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.;
New Bedford, Mass.; Rome, N. Y.—Sales Offices in
Principal Cities, Distributors Everywhere.

Listen to *Exploring the Unknown* on the Mutual Network every Sunday evening, 9 to 9:30 p.m., EST.



THE INSTITUTE GAZETTE

(Continued from page 166)

Prisms and Gratings

THE M.I.T. program of reconversion from war-time to peace-time projects includes a reorganization of the spectroscopy laboratory and extension of its facilities for co-operative research and graduate instruction. Prior to the war the spectroscopy laboratory was a part of the research laboratory of physics, of which Dr. George R. Harrison was director, and its activities were concerned primarily with problems of interest to physicists. During the war the laboratory was devoted almost entirely to work for the Manhattan District.

In view of the valuable contributions which spectroscopy can make to research in all the basic sciences, the scope of the M.I.T. program in spectroscopy has been enlarged by making the facilities of the spectroscopy laboratory more directly available to research workers in biology, chemistry, geology, metallurgy and physics.

The laboratory is now in process of reconversion and will shortly have facilities in working order for research in all principal fields of spectroscopy. Specific research programs have been planned in wavelength and intensity measurements, ultraviolet, visible, and infrared absorption spectrophotometry, and the Raman and Zeeman effects.

The spectroscopy laboratory will be operated under the supervision of an advisory committee composed of Dr. George R. Harrison, Dean of Science, Dr. Richard C. Lord, director of the laboratory and Dr. John R. Loeb, professor of biophysics.

ORIENT MAILS "VIA PACIFIC"

(Continued from page 154)

St. Joseph, Missouri, to and from San Francisco, on a schedule which put New York and San Francisco but 12 days apart. Eventually its original charge of \$5 per half-ounce was reduced to \$2, and then to \$1, but the completion of the trans-continental telegraph in the autumn of 1861 precluded the continuance of the Pony Express with a hope of profit. Similarly, the ultimate discontinuance of the overland stage-routes — and of the coast-to-coast mail service via Panama — was forecast when the Union Pacific railway was chartered in 1862. It was in these circumstances that, at the close of the Civil War when Congress again turned attention toward the Far East, the Pacific Mail Steamship Company stood ready as the sole-bidder for the newly authorized mail-steamship service to the Far East.

Pacific Mails' Pioneer Wooden Side-Wheelers

Postmaster General William Dennison advertised inviting proposals for the new trans-Pacific line on March 20, 1865, and the Pacific Mail Steamship Company's tender was accepted on the following August 28, although its formal contract with the government was not executed until October 16, 1866. By this contract, in return for an annual payment of \$500,000, the maximum amount permitted under the Act, the Company undertook to establish a "... monthly line of first-class sea-going side-wheel steamships of from thirty-five hundred to four

thousand tons burden each, government measure and of sufficient number, not less than four, to perform the required monthly service for and during a term of ten years, commencing on or before the first day of January 1867, and from the day the first steamship of the line shall depart with the mails for the Sandwich Islands . . .” to Yokohama, and Hong Kong.

In addition to other liabilities which the Company would incur for non-performance or delays, the contract specified that, "... suitable fines shall also be imposed unless the delinquency shall be satisfactorily explained to the Postmaster General, in due time, for failure to take or deliver the mail or any part of it; for suffering it to be wet, injured, lost or destroyed; for carrying it in a place or manner that exposes it to depredation, loss, or injury, by being wet or otherwise; and for setting up, or running, an express to transmit letters or commercial intelligence in advance of the mails; or for transmitting knowingly, or after being informed, any one engaged in transporting letters or mail matter in violation of the laws of the United States. . . .”

To fulfill its obligations the Company ordered four new steamers especially designed for the Far Eastern service: *China* from William Henry Webb of New York (previously the builder of *California*, *Panama*, *Colorado*, and other Pacific Mail liners); and *Great Republic*, *Japan*, and *America* from Henry Steers of Greenpoint, Long Island. Although each of these ships would coal regularly at Yokohama in both directions, the distance between California and Japan made obligatory a bunker capacity of 1,500 tons, in order to supply a 45-ton average daily consumption required to drive the 40-foot diameter paddle-wheels to accomplish an average sea-speed of 9.5 knots. Each ship had 1,500 horsepower vertical walking-beam engines built by the Novelty Iron Works of New York. These steamers, each of which cost just over \$1,000,000, measured approximately 4,000 tons gross apiece, and they averaged 380 feet in overall length, 50 feet in extreme beam, and somewhat over 20 feet in load draft. The ships, however, differed in their accommodations, *e.g.* *Great Republic* had a capacity of 250 in the cabin and 1,200 in the steerage, while *China* was designed to carry 500 first- and second-cabin passengers and 800 in the steerage.

Even today these ships retain a position of significance in the annals of naval architecture for, in the words of Professor John Haskell Kemble, "these Pacific Mail monsters were the largest wooden commercial steamers ever built, and were the last of the great ocean steamers to be driven by paddle-wheels."

The keels of the first pair were laid down early in 1866, but the launchings of the *Great Republic* on November 8 and of *China* (as *Celestial Empire*, which name she bore until her trial trip) on December 8 came too late to permit either vessel being sent around South America in time to inaugurate the new service from San Francisco westbound on the appointed date of January 1, 1867. The distinction of making the pioneer voyage thus fell to *Colorado*, which also completed two further roundtrips before she became a spare ship and was superseded on the regular trans-Pacific schedules by *Great Republic* and *China*.

Service was maintained at six-week intervals until the arrival of *Japan*, originally known as *Nippon* when
(Continued on page 170)

Rogers Peet Company

MAKERS OF FINE CLOTHES for Young Men and Men Who Never Grow Old



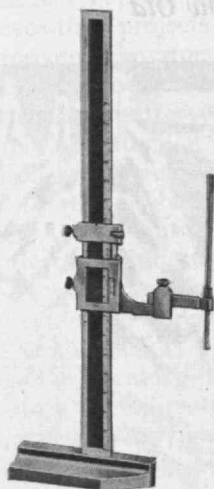
The nerve-tingling thrill of skiing, the breath-taking flight 'mid snow and pines, demands heart, skill and nerve control — a control that must approach perfection . . . At Rogers Peet the same basic idea — the approach to per-

fection — is always uppermost in the mind of our Master Designer — perfection in fabric, style, tailoring and fit — perfection in clothes for young men, and men who never grow old. Get to know the modern Rogers Peet.

FIFTH AVENUE at 41st STREET, NEW YORK 17, N. Y.
THIRTEENTH ST. at BROADWAY, NEW YORK 3, N. Y.
WARREN STREET at BROADWAY, NEW YORK 7, N. Y.
TREMONT ST. at BROMFIELD ST., BOSTON 8, MASS.

The right thing in everything men and boys wear

TO COMPLETE
THIS PICTURE



ADD THE RIGHT STARRETT TOOL

Add a Starrett Vernier Height Gage to the photo above and you have a picture that is familiar wherever fine precision work is done. Starrett Tools inspire the confidence of those who use them — help them make the most of their skill and experience. That's why it pays to insist upon *Starrett Tools* for all important measuring and inspection jobs. Be sure to specify *Starrett* when you requisition precision measuring tools.

Buy through your distributor

THE L. S. STARRETT CO., ATHOL, MASS., U. S. A.
WORLD'S GREATEST TOOLMAKERS

STARRETT

PRECISION TOOLS • DIAL INDICATORS • STEEL TAPES • GROUND FLAT STOCK
HACKSAWS • BAND SAWS FOR CUTTING METAL, WOOD, PLASTICS

INTER-OFFICE MEMO

To: PLANT ENGINEER

Subject: PLANT RENOVATIONS

Secure services of experienced
construction company with rep-
utation for quality-responsibil-
ity—and low cost.

From: PLANT MANAGER

HORN BROTHERS

Incorporated

Building Construction

23 MINER STREET • BOSTON, MASS.

G. ARTHUR HORN, Treas.
Spec. Student '37

A. B. ELLENWOOD, JR. '34

ORIENT MAILS "VIA PACIFIC"

(Continued from page 168)

launched by Steers on September 17, 1867. Monthly schedules became effective on August 3, 1868, when *Japan* departed from San Francisco on her maiden voyage. The fourth ship, *America*, was launched July 23, 1868, and, unlike her predecessors, was sent out to the Pacific via the Cape of Good Hope rather than around South America. She reached Hong Kong on August 21, 1869, entered the trans-Pacific mail service from there on September 18, and completed her first eastbound crossing at San Francisco on October 20.

During 1866, in planning for the four new steamers, certain objections arose against the provision in the Act of February 17, 1865, requiring stops at Honolulu on each outward and inward voyage. The principal trouble, in the words of Mr. Dennison's successor, Postmaster General Alexander W. Randall, was that,

... the contractors encountered a practical difficulty arising out of two conflicting conditions: first, the necessity of constructing ships that could make the long voyage of 7,087 miles between San Francisco and Hong Kong, by the route named in the law, with safety and success, as regards the main object for which Congress authorized the establishment of the line; and secondly, the practicability of securing that object, without making the ships so large as to preclude, by their heavy draught, the possibility of entering the harbor of Honolulu, which had a depth of water, under favorable circumstances, of barely 21 feet

Although the law, and the contract executed in pursuance thereof, name Honolulu as an intermediate port, the fact appears to be established by reliable official information, that the laws which govern the Pacific Ocean, render it unwise, if not incompatible with the complete success of the enterprise, to require the steamships to touch at the Sandwich Islands on their passages between San Francisco, Japan, and China.

Mr. Randall therefore acquiesced in the omission of a call at Honolulu by *Colorado* on its pioneer voyage, and his recommendations to Congress resulted in the Act of February 18, 1867. Under this legislation, Pacific Mail steamers were permitted to ply non-stop between San Francisco and Yokohama, upon the condition, as expressed in an amended contract signed March 20, 1867, that the Company would commence a "branch service from Yokohama to Shanghai and back in connection with the steamship leaving San Francisco on third July, eighteen hundred and sixty-seven."

Prior to the actual institution of this branch service, it was announced in Shanghai that *Colorado* would call there on May 22, 1867, when homeward bound from Hong Kong on her second round trip. This arrangement had to be altered, however, and instead a connection was made with her "off the Saddles"—a small group of islands in the estuary of the Yangtze—by *Yesso*, a British steamer belonging to Dent and Company. But when *Colorado* arrived at Yokohama on July 27, westbound on her third round trip, she was greeted by Pacific Mail's *Costa Rica*, which took off the Shanghai mails and passengers and delivered them at destination on August 3, a day less than one month out of San Francisco.

Both the 1,950-ton *Costa Rica* and the 2,217-ton *New York* had been purchased by the Pacific Mail from Cornelius Vanderbilt after they had seen service between

(Continued on page 172)

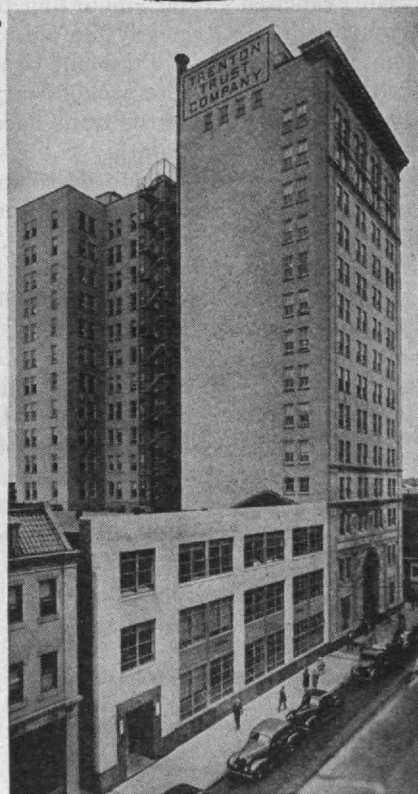
Cornerstone says "1924" Heating Results say "1946"

Twenty-two years of keeping up-to-date—that's the reason for the heating comfort and economy enjoyed by Trenton Trust Company.

Trenton Trust was founded in 1888—the same year Webster started serving steam-using customers. In 1924 when their present building was built it was provided with a Webster Heating System. Webster Sylphon Traps were installed on the 614 radiators and vacuum assured by a Nash Vacuum Pump.

Thus started a business relationship that has continued for 22 years. Webster worked with the architect and the contractor, Piper Brothers, on the original installation. In 1939 Webster worked with Walter E. Bittner, Trenton contractor, on the extension. At that time, in order to give the entire building full advantage of newer developments, a 4-zone Webster Moderator System with balancing orifices and automatic control-by-the-weather was added.

It takes more than proper selection of equipment to get maximum results in comfort and low-cost in a



Home of Trenton Trust Company
Trenton, N. J.
Mercer County's Oldest Trust Organization
Bank and 14-story office building erected 1924. Alfred C. Bossom, Architect. Extension at left added 1939, Fowler and Kaplan, Architects, Runyan & Carey, Engineers.

large heating installation—teamwork to assure proper use is also essential. Throughout the 22-year record of this installation, teamwork has been provided for Trenton

Trust by Maurice Neeley, now Superintendent of Maintenance and Operations, and Samuel M. Brooks, Webster Service Engineer. Repairs have been few, but promptly made when needed; maintenance has been regular; pressures have been kept low.

Maurice Neeley
Supt. Maintenance &
Operations for Trenton
Trust Company Building,
with Trenton Trust
since 1924.



S. M. Brooks
Service Engineer. Dean
of Webster service men,
with the Company
since 1910, now coaching
a corps of young
veterans, giving them
the benefit of his practical
experience.



We solicit the opportunity to work with you in the same way we have, been privileged to work with Trenton Trust.

WARREN WEBSTER & CO., Camden, N. J.
Representatives in principal U.S. Cities : Est. 1888
In Canada, Darling Brothers, Limited, Montreal

Webster

HEATING SYSTEMS

Webster Heating Equipment for Today's New Buildings



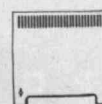
Webster Metering Orifices, expertly sized, a vital feature of the Moderator System, balance distribution and make possible central control with continuous heating.



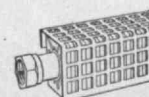
Webster Outdoor Thermostat Control, automatically provides the lowest pressure for comfortable inside temperature.



Webster Float and Thermostatic Drip Traps are used on heating coils of air conditioners and drip points of the piping system.



1946 Webster System Radiation—concealed convectors made of copper tubing and aluminum fins, with integral Webster Traps and Valves.



New! Webster Type W I Radiation for installation where floor or wall space is limited.

ORIENT MAILS "VIA PACIFIC"

(Continued from page 170)

New York and Aspinwall, on the Atlantic side of the Isthmus of Panama, and both were sent out to the Far East via the Cape of Good Hope. *New York* was assigned regularly to the Shanghai-Yokohama branch line, but also served as a spare steamer for the main line. In April, 1868, she temporarily replaced *Great Republic*, which fractured her starboard paddle-shaft when westbound for Yokohama, at which port she had to lay until *Colorado* could bring out a replacement part from San Francisco. The accident occurred when *Great Republic* was some 3,300 miles from San Francisco and 2,100 from Yokohama, but her sturdy qualities were such that, in the words of Postmaster General Randall, she was "nevertheless able to proceed on her voyage, reaching Yokohama by the use of one wheel, and attaining, under these adverse circumstances at one of the stormiest seasons of the year, the remarkable speed of 173 nautical miles a day." A third ship was added to the branch line by 1869, the comparatively new 1,915-ton *Oregonian*, and a fourth and fifth in 1871, the 1,736-ton *Ariel* and the 1,870-ton *Golden Age*. By then there were four sailings monthly between Shanghai and Yokohama.

Semi-Monthly Schedules and the Introduction of Iron Screw Liners

On her first two voyages from San Francisco, *Colorado* carried 2,473 letters and 5,967 newspapers, the total postage collected thereon, at 10 cents and two cents, re-

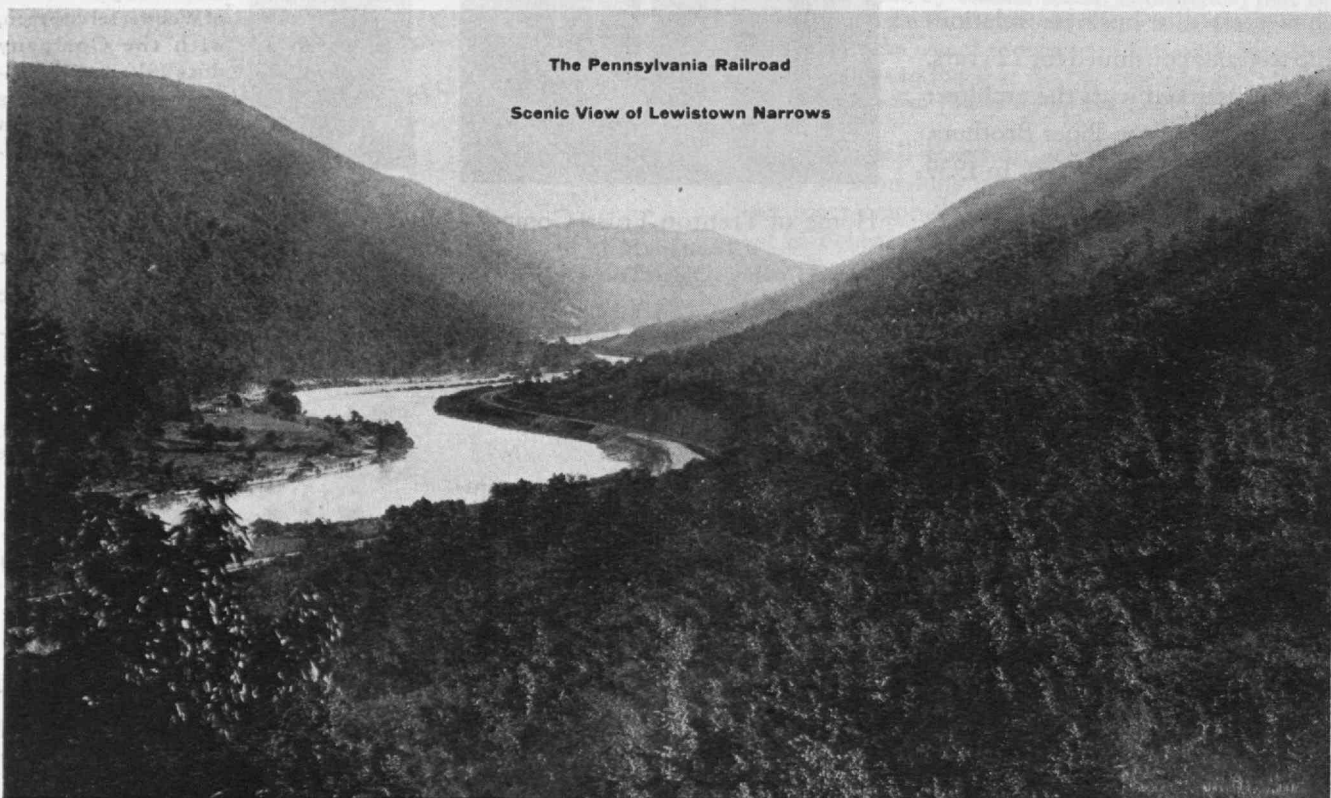
spectively, being \$366.64. The average figures for the first ten outward voyages to the Orient were equally modest, viz.: 1,913 letters and 2,185 newspapers, yielding an average postal revenue per voyage of but \$203.09. In mid-June of 1869, however, the opening of the trans-continental railway brought about a sharp increase in the volume of postal traffic handled via Pacific. During the fiscal year 1870-1871, for example, the number of letters sent westbound from San Francisco was four times the total sent during 1867-1868, the number of newspapers sent was sevenfold greater, and the postal receipts thereon amounting to \$19,596.90 represented an increase of nearly tenfold.

President Grant's first Postmaster General, John A. J. Creswell of Maryland, therefore urged that the schedules of the trans-Pacific mail steamers be stepped up to semi-monthly sailings, and Congressional authority for a subsidy to do so was embodied in Sections 3 and 4 of the Post Office Appropriation Act of June 1, 1872. This Act required, "... that all steamers hereafter accepted for such service shall be of not less than 4,000 tons register each, and shall be built of iron, and with their engines and machinery shall be wholly of American construction, and shall be so constructed as to be readily adapted to the armed naval service of the United States."

The Pacific Mail was the sole bidder responding to the advertisement of the Postmaster General issued on June 5, and by the terms of a contract dated August 29, 1872, the Company undertook, in return for an additional \$500,000 per year, "... for a term of ten years from

(Continued on page 174)

The Pennsylvania Railroad
Scenic View of Lewistown Narrows



P O O R & C O M P A N Y
C H I C A G O

Manufacturers of Railway Equipment used by Railways throughout the world

OUTSTANDING PROPERTIES OF SANDEE POLYSTYRENE

1. Specific Gravity — 1.05
2. Tensile Strength — 5500 to 7000 P.S.I.
3. Impact — 0.5 ft. lbs (notched)
4. Heat distortion — 175° F
5. Rigidity — Excellent
6. Dimensional Stability — Excellent
7. Water Absorption — Nil
8. Burning Rate — Slow
9. Electrical properties — Excellent
10. Odor — None
11. Color — Unlimited
12. Finish — High Gloss if Desired



Sandee POLYSTYRENE Extrusions

AVAILABLE IN LARGER QUANTITIES NOW!

THE successful extrusion of Polystyrene into heavy sections has generally been considered very difficult, if not impossible! However, Sandee research has succeeded in developing practical methods and machinery which have produced substantial runs of heavy sections to a high degree of quality and uniformity. Production quantities of louvers or side shields of curved and intricate designs have been extruded for manufacturers of fluorescent light fixtures. If a polystyrene extrusion is indicated for your product let Sandee skill and experience aid you in securing a light or heavy section of finest uniform quality.

ELMER SZANTAY, General Manager—'35

SALES REPRESENTATIVES IN 19 PRINCIPAL CITIES

Sandee Manufacturing Company

5050 FOSTER AVENUE • CHICAGO 30, ILLINOIS

EXTRUDED PLASTICS AND SPECIAL TOOLS



at **ARNOLD** THERE IS NO CEILING ON QUALITY

We are not satisfied merely to offer you magnets which come up to the proposed R.M.A. standards . . . this is our minimum requirement. A quality floor below which we refuse to go.

Nor are we satisfied that ordinary production and inspection methods offer you adequate quality protection . . . we *individually test* each Arnold magnet in a loud speaker structure before shipment.

Another "individual touch" which has contributed to winning industry-wide customer acceptance for Arnold magnets is our established minimum standard of 4,500,000 BHmax for Alnico V material.

Over five million Arnold loud speaker magnets of the R.M.A. type have been produced since V-J Day under these quality safeguards. Continued adherence to them assures you of long-lived, dependable product performance.

In the mass-production of magnets, the Arnold "individual touch" does make a difference. Let us give you the whole story.

THE ARNOLD ENGINEERING COMPANY

SUBSIDIARY OF ALLEGHENY LUDLUM STEEL CORPORATION

147 EAST ONTARIO STREET, CHICAGO 11, ILLINOIS

Specialists in the manufacture of ALNICO PERMANENT MAGNETS

ORIENT MAILS "VIA PACIFIC"

(Continued from page 172)

and after the first day of October, 1873, . . . to despatch an additional steamship from San Francisco on the 16th of each month, or upon such other days as may hereafter be selected, with the approval of the Postmaster General, the departures to be always so arranged as to alternate at equal or regular intervals with those of the present monthly line during its continuance."

In May of 1872, when it appeared probable that Congress would grant the extra subsidy for additional trans-Pacific service, the Pacific Mail began to run extra steamers once a month on its own initiative. For the mails so carried, "sea-postages" were allowed by the Government to the Pacific Mail "as full compensation under the provisions of the general law fixing the rate of compensation for the sea-conveyance of mails." Reimbursement continued on this basis through 1873, 1874, and into 1875, for it was not until July, 1874, nine months after the stipulated time for the commencement under contract of the additional subsidized service, that the Pacific Mail's required iron steamers were ready — *City of Peking* and *City of Tokio* 5,500-ton liners costing more than \$1,100,000 apiece and driven by screws rather than paddle-wheels.

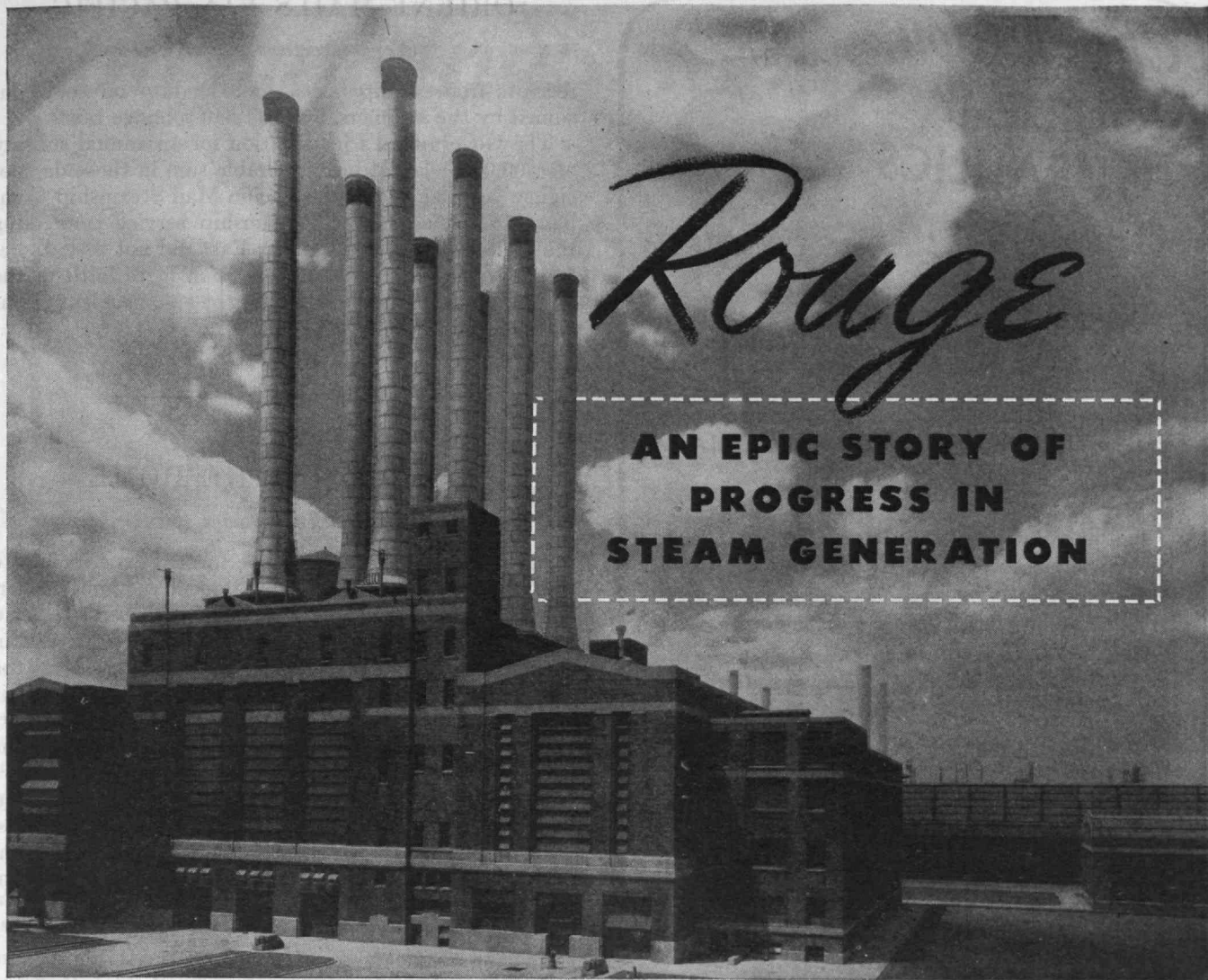
The Postmaster General was tolerant about the delay, and the Attorney General supported his contention that the new contract was still in force. But the Pacific Mail was under fire for illegal lobbying in connection with the contract, and in March, 1875, these complaints caused a repeal of its additional subsidy. By the following July, the Pacific Mail went back to a monthly schedule, and alternated its sailings with the monthly departures of the new Occidental and Oriental Steamship Company which began trans-Pacific service in that month.

Coincident with the inauguration of semi-monthly sailings, postal traffic via Pacific attained new higher levels, which were maintained throughout the 1870's. The time saved by the Union Pacific Railway more than offset the corresponding quickening of the route via Suez by the opening of the canal to commercial vessels in November, 1869, and the substitution of Brindisi (at the heel of the Italian boot) for Marseilles as the European port for the reception and despatch of Indian, Australian, and Far Eastern mails in 1871, when the Mt. Cenis Tunnel (begun in 1857) became available for traffic. English merchants at Yokohama, for example, preferred to send their letters to London by way of San Francisco not only because the rate was less (from the spring of 1876, 10 cents per half ounce compared with 28 cents), but because the letters were delivered in 43 days as contrasted with the 50 days required by way of Suez.

Some Finances

During the first five calendar years of operation (1867 to 1871), the subsidy actually paid to the Pacific Mail totalled \$2,500,000, while the postage receipts amounted to only \$69,744. Postal receipts, however, were not the sole tangible usufructs the government derived for, according to official estimates, the establishment of the line brought to the national Treasury during this period over \$3,000,000 of extra revenues, viz.: \$2,884,000 increased customs duties at San Francisco, \$162,000 gross

(Concluded on page 176)



Rouge, so named because it is located on the River Rouge in Detroit, is the world-famous main production plant of the Ford Motor Company.

It is famous for other reasons than its huge size and great production achievements. It also has the largest steam electric power station serving any industrial establishment, anywhere.

When the Rouge Power Station was built back in 1920, it began setting new records immediately by installing boilers capable of producing 200,000 lb of steam per hour, the largest boilers ever built up to that time, and firing them with pulverized coal — then considered a revolutionary method. Yet only five years later Rouge began rebuilding four of its eight boilers to take advantage of water-cooled furnaces and other new developments which resulted in more than doubling their capacity.

But this was only the beginning of the Rouge modernization program. In 1930 Ford took the drastic step of completely discarding two of the boilers installed only 10 years before and replacing them with two 1400-lb pressure boilers, each capable of producing 700,000 lb of steam per hour. These were by far the largest super-pressure boilers built up to the time. By 1939 the remaining two original boilers had been replaced with 1400-lb pressure units, each of which was capable of producing 1,000,000 lb of steam per hour.

Thus, within twenty years, the most modern industrial power

plant of its time had rebuilt or replaced all its original boilers, had nearly quadrupled its original capacity and had substantially increased its efficiency. And all this was accomplished within the same floor space which the eight original units had occupied.

Because it so impressively exemplifies contemporary progress in the field of steam generation, the Rouge Power Plant is not only a source of pride to its owners but also to Combustion Engineering, the supplier of boilers and all related equipment for Rouge from its inception through every stage of its modernization to date.

A-982

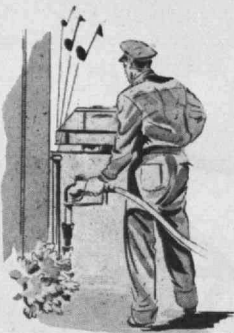
COMBUSTION ENGINEERING

200 MADISON AVENUE, NEW YORK 16, N. Y.
C-E INSTALLATIONS COVER ALL STEAM REQUIREMENTS FROM 30
HORSEPOWER BOILERS TO THE LARGEST POWER STATION UNITS



Thank You, COURSE I, HYDRAULICS OPTION...

YOU MADE VENTALARM POSSIBLE!



Now, nearly a million oil-heated homes enjoy the safety and convenience of VENTALARM —the Whistling Tank Fill Signal.

VENTALARM:

- Makes household fuel oil delivery sure, safe, AUTOMATIC.
- Eliminates non-delivery stops and return trips. Every stop a drop.
- Eliminates tank overflow, spills, wasted oil and fire hazards.
- Saves 5 to 7 minutes of truck and driver time per drop.
- Eliminates entry of driver into the home.

If you are not enjoying the benefits which VENTALARM affords, ask your oil company about equipping your tank with VENTALARM.



How do you like gasoline spilled over your fender? It means wasted money and stained fenders. Do you like waiting impatiently, while gasoline is dribbled into your tank?

The automotive VENTALARM, now standard equipment on 15 automotive makes, including the Packard Clipper, Chrysler Imperial and Willys Station Wagon, assures that the gasoline tank can be filled at full pumping speeds, to a predetermined level within the tank . . . without blowback, spillage or hazard.

Ask for VENTALARM when you purchase your new automotive equipment. VENTALARM saves your money, time and temper.

SCULLY SIGNAL COMPANY
CAMBRIDGE 41, MASSACHUSETTS

Frank P. Scully, '15, President



ORIENT MAILS VIA PACIFIC

(Concluded from page 174)

receipts from stamp taxes, \$68,000 duty on coal consumed by the steamers, and \$71,340 tonnage taxes.

The Government's justification for an annual subsidy of \$500,000 — a not inconsiderable sum in those days of eighty years ago — to the Pacific Mail Steamship Company to pioneer a mail steamship service connecting the United States and the Far East did not rest, therefore, even in the initial stages, upon mere faith in the potentialities the venture had for the enhancement of our national prestige.

VACUUM IN THE HOME

(Continued from page 160)

In 1905 German hygienists performed experiments to test the efficiency of an English model vacuum cleaner. In these trials wet gelatine plates were exposed to show a comparison between the amount of dust which settled in ordinary beating and sweeping and that raised by the new vacuum cleaner. The machine is described as if it were some newly discovered variety of plant life. Favorable tests notwithstanding, the hygienists concluded that vacuum cleaning failed to save either time or labor.^{18, 19}

In keeping with the general trend of household mechanization the initiative then passed into American hands. The Americans support the candidacy of David T. Kenney who "installed the first mechanical cleaning system in which the vacuum alone was used as a cleaning agent"²⁰ in the Frick Building, New York City in 1902. Kenney's pioneering patent was granted by 1901 and is said to have been lying in the Patent Office for years before. Here the chronological trail becomes rather blurred, but it seems that America pioneered the stationary models while England and France developed the early mobile ones.

In the uncertainties of early development, one thing is certain, however. The American vacuum cleaner industry — whether it manufactured portable or stationary machines — became licensees of the Kenney patents, the validity of which was upheld in official inquiry into the vacuum cleaner industry. "The Kenney patents are the basic vacuum cleaner patents that have been litigated and upheld by the courts."²¹

Vacuum Becomes a Household Tool

The circle closes some six decades after the advent of the first portable machines in which suction was tried. In the interval the type of cleaner having bellows and revolving brushes had received most attention. In 1917, (the year in which a large mail order firm introduced the portable electric model) the public was assured that the

(Continued on page 178)

¹⁸ G. Richou, *Nettoyage sanitaire par le vide*, La Nature (Paris, 1903), p. 577.

¹⁹ Dr. Berghaus, *Der Vacuumreiniger, ein Apparat zur staubfreien Reinigung der Wohnraume*, Archiv fuer Hygiene, vol. 52 (Muenchen, 1905).

²⁰ Cooley, *op. cit.*, p. 13.

²¹ Report of the Federal Trade Commission on the House Furnishing Industry, p. 6 (Washington, October 5, 1925).

Announcing

A New Technical Series on Building Construction

DWELLING HOUSE CONSTRUCTION

By **Albert G. H. Dietz, Sc.D.**, Associate Professor of Building Engineering and Construction, Massachusetts Institute of Technology

This text, the first of a series of ten titles, comprises a college course in dwelling house construction that is complete from the inspection of the site to the last coat of paint — with the exception of the mechanical, electrical and plumbing equipment. Included are numerous excerpts from specifications, zoning ordinances and building codes which tie in actual practices with the more general discussions of construction details. It shows how the same construction details may be used for highly di-

versified architectural styles, and places emphasis on durable weathertight construction.

CONTENTS: Inspection of the Site; Building Layout; Excavation; Sanitary Systems; Foundations; Framing; Chimneys and Fireplaces; Windows; Roofing and Slashing; Cornices; Gutters and Leaders; Exterior Finishes; Water Tables; Insulation; Lath and Plaster. "Dry Walls" Interior Finish; Hardware; Painting.

384 Pages • 6 x 9 • Cloth • Illustrated • \$6.00

NINE OTHER TITLES

Each of the ten titles in this series has been designed to furnish students, contractors, builders, manufacturers and architects with an authoritative and dependable library of essential facts. Prepared under the editorship of Walter C. Voss, head of the Engineering and Construction Department of the Massachusetts Institute of Technology, they reflect the long experience and engineering skills of the authors represented. New titles will be published at frequent intervals in the near future. A complete list of titles follows:

Semi-Fireproof Construction
By *Howard R. Staley*

Heating, Ventilating and Air Conditioning for Buildings
By *James Holt*

Electrical Services for Buildings
By *Willard W. Thompson*

Fireproof Construction
By *Walter C. Voss*

Organic Materials of Construction
By *Albert G. H. Dietz*

Sanitary Services for Buildings
By *William J. McAuliffe*

Metal Materials of Construction
By *Albert G. H. Dietz, Carl F. Floe and Robert S. Williams*

Masonry Materials of Construction
By *Howard R. Staley*

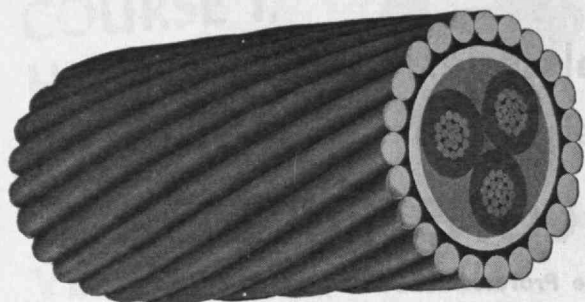
Estimating and Job Management
By *Arthur R. O'Neill and Walter C. Voss*

If you are interested in obtaining an examination copy of "BUILDING HOUSE CONSTRUCTION" or of any other forthcoming titles in this series, please address your request to:

D. VAN NOSTRAND COMPANY, INC.

250 Fourth Avenue • New York 3, New York

ONE AMONG THOUSANDS



OF

POWER CORDS AND CABLES

designed by Simplex to meet
unusual service requirements.

Can we help you with your problems?

Call KIRKland 9000

SIMPLEX WIRES AND CABLES

SIMPLEX WIRE & CABLE CO.

79 Sidney St., Cambridge 39, Mass.



Reg. U. S. Pat. Off.

Samson Cordage Works

Boston 10, Mass.

Manufacturers of braided cords of all kinds, including sash cord, clothes line, trolley cord, signal cord, shade cord, Venetian blind cord, awning line, etc., also polished cotton twines and specialties.

SPOT CORD

Reg. U. S. Pat. Off.



Our extra quality sash cord, distinguished at a glance by our trade-mark, the colored spots. Especially well known as the most durable material for hanging windows, for which use it has been specified by architects for more than half a century.

VACUUM IN THE HOME

(Continued from page 176)

bellows machine "accomplishes practically as much as an electric cleaner at much less cost."²²

After a lapse of several decades the standard types of vacuum cleaner were developed within a few years. During 1901 and 1902 there emerged the first satisfactory stationary plants in America and England. The first portable vacuum cleaner is said to have materialized in 1905,²³ but this American machine, with large turbine fan and motor mounted on a chassis, was still rather bulky and more nearly resembled the French semi-mobile machines than the later and lighter household appliances. Two years later, in 1907, patent specifications were submitted for a more portable machine tending toward the now standard form.²⁴ The fan revolved around a vertical spindle coupled directly to the motor, just as in Tesla's electric fan of 1889. The carefully shaped motor casing was made to carry a swivelled handle. In brief, the carpet sweeper had become not only mechanized but electrified. Subsequently the main trend was to be directed toward simplifying and reducing the number of parts as James M. Spangler, the inventor, stated in his next patent issued in 1915: "The object of this invention is to provide a construction which will be composed of a few simple parts, put together in a practical mechanical manner."²⁵ In short, in the development of the electric vacuum cleaner, hardly more than five years elapsed from the advent of the cumbersome units to the creation of a portable form which was so widely adopted as to make it an everyday household tool.

Competition of Water and Electric Power

The specialists were skeptical of the trends which had become quite marked by the end of the first decade of the Twentieth Century. As late as 1912 some skeptics thoroughly disbelieved that smaller and more dependable types were not possible. One of them makes the point particularly clear by refusing to discuss portable types.²⁶ Another, who treats the vacuum cleaner question of his time most thoroughly, is somewhat less emphatic, remarking in 1913 that "it will be the survival of the fittest."²⁷ He believed that the vacuum cleaner "is at the height of its career, like the automobile."

The skepticism of the experts was not wholly unfounded as is evidenced by the diversity of attempts to find an adequate motor and a satisfactory form of portable mechanism. In 1910 the stationary installations, with suction pump and dust separator in the cellar, were used mainly in residences. A catalog of the time shows

(Continued on page 180)

²² Catalogue of the Montgomery Ward Company, 1917, p. 704.

²³ Illustrated by M. S. Cooley, *op. cit.*, p. 16. Inventor: Dr. William Noe, San Francisco.

²⁴ U. S. Patent 889823, June 2, 1908. James M. Spangler. He already shows the dust bag.

²⁵ U. S. Patent 1151731, August 31, 1915. This is the machine which was made over to the Hoover Suction-sweeper Company, a corporation of Ohio. In a sequence of further improvements the present standard type was developed.

²⁶ Arthur Summerton, *Treatise on Vacuum Cleaning* (1912): "We shall confine this treatise to the stationary system as we believe satisfactory results in cleaning cannot be expected from portable machines."

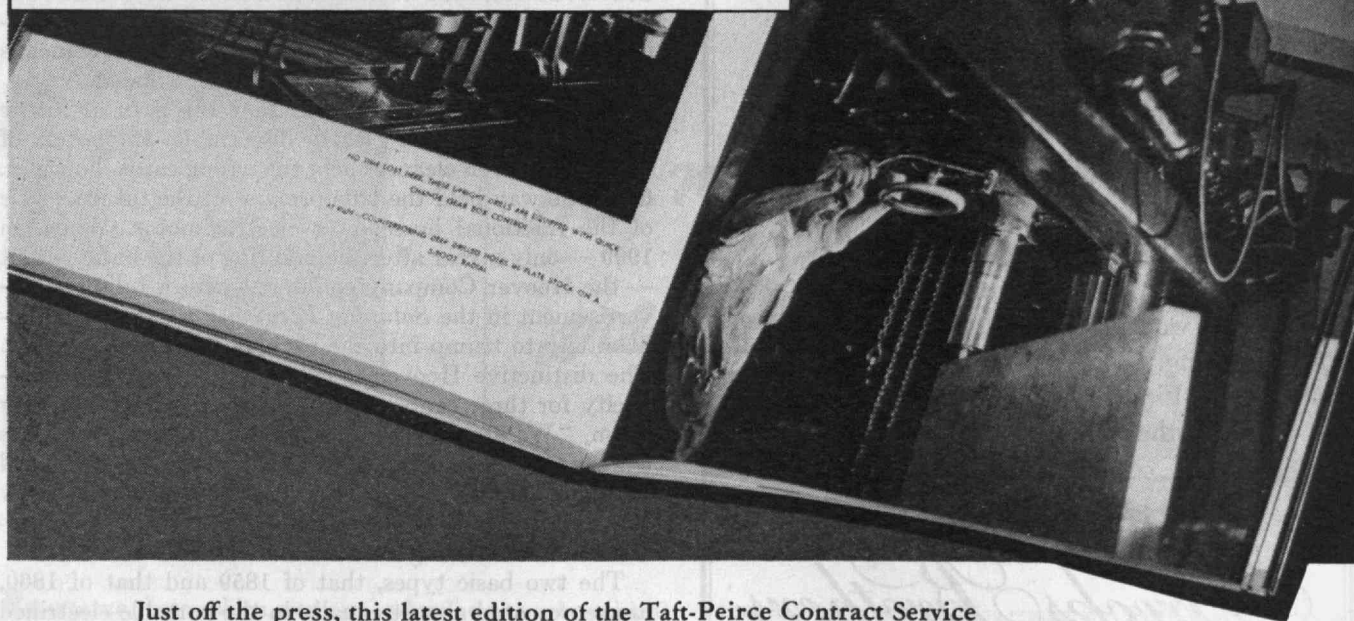
²⁷ M. S. Cooley, *op. cit.*, p. 20.



THIS BOOK

Takes You Through

ONE OF THE WORLD'S
MOST UNUSUAL PLANTS

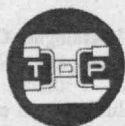


Just off the press, this latest edition of the Taft-Peirce Contract Service Brochure conducts you personally through the extensive facilities of our modern and unique manufacturing organization with its unmatched complement of equipment and experience.

Here, passing in review, you will find an engineering staff, experienced in tool and machine design, and a picked corps of craftsmen, manning an array of machine tools capable of tooling, building, and delivering on regular schedule anything you need — no matter what your industry or product — from a single tool, part, or pilot model, to quantity lots of complete mechanisms.

This picture-and-caption trip will take you just about 20 minutes from cover to cover. SEND FOR YOUR COPY TO:

THE TAFT-PEIRCE MANUFACTURING COMPANY, Woonsocket, Rhode Island



For Tooling, Engineering, Contract Manufacturing
TAKE IT TO TAFT-PEIRCE



LOOKING AHEAD INTO OUR 129TH YEAR

WE EXPECT GREAT THINGS of the year ahead and earnestly hope to deliver every one of our expectations to you in terms of tangible Merchandise . . . and Service.

CONTINUING, AS ALWAYS, to operate our own manufacturing shops . . . making BROOKS BROTHERS clothes and many accessories . . . we announce definite improvements in production.

SUPPLEMENTING THINGS of our own make, our British importations are resuming in a way we haven't known since before the war. The celebrated Hats, Shoes, Gloves, Socks, Sweaters, etc., so closely identified with BROOKS BROTHERS, should be increasingly available.

WE HAVE A LARGER working staff and a better working plant. So things look promising. *Our New Year's resolution* for 1947 is: First principles of 1818 expressed in up-to-the-minute 1947 terms.

ESTABLISHED 1818

Brooks Brothers,
CLOTHING,
Mens Furnishings, Hats & Shoes

346 MADISON AVENUE COR. FORTY-FOURTH ST.
NEW YORK 17, N. Y.

*Now in the Second Quarter of our
Second Century, 1818-1947
as Civilian, Military & Sporting Outfitters*

BOSTON BRANCH
46 NEWBURY, COR. BERKELEY STREET, BOSTON 16, MASS.

VACUUM IN THE HOME

(Continued from page 178)

the master of the house in the parlor with the butler giving his coat a few strokes with the suction nozzle fixed to the end of the vacuum hose. On the floor above the maid is performing a similar operation on the lady's hat, and other domestics are cleaning the furniture and carpets. The vacuum cleaner and prosperity were soon identified as a single concept.

In the period around 1910 water motors or other prime movers were also used to power vacuum cleaners as well as washing machines. Water-powered motors were always used in stationary installations working by suction alone. Ease of operation of such equipment was stressed in such advertising copy as: "All you have to do is push a very light tool over the floor." With a thrust at the portable electric models the user was assured that the water-powered type "never wears out; will last as long as your building . . . better results without any machinery . . . no dirty bags with germs to empty. . . ." ²⁸ Another appliance, the Water Witch, was featured as being light and almost entirely built of aluminum. The Water Witch "pumps by means of a water wheel" and can be "set temporarily in the kitchen sink or bath tub." The dust sucked up was drawn through the pump and was carried away by the water. ²⁹ Enticing accessories, such as a massage vibrator outfit, or hair-drying apparatus, were delivered with some devices. The user of one of these was advised that "the heaviest head of hair is quickly, thoroughly, and hygienically dried after a shampoo, by means of the current of pure fresh air from the exhaust."

Here were ample indications that the path of future development was not clearly discernible. Promoters of the water driven cleaners held the wrong cards, however. Only one way held the true promise of the future — use of the fractional horsepower electric motor. When, in 1909 — only a year after the granting of the basic patent — the Hoover Company countered with a full-page advertisement in the *Saturday Evening Post*, it seemed deliberately to trump into the claims of the Water Witch. The distinctive Hoover motto was, "Sweep with electricity for three cents a week." In spite of the haughty claim, "We are now turning out hundreds of machines a week, the demand is enormous," the number of rival attempts, a few of which have been mentioned, show that the success was not unmitigated. The path of electric drive was the right one.

The two basic types, that of 1859 and that of 1860, are represented almost equally in the portable electrified models of today. The suction type of 1859 survives in today's tank type of vacuum cleaner ³⁰ in which the operator holds only the suction nozzle, as in the earlier, stationary types while the motor and dust-bag cylinder slides on the carpet on runners. The handle type of vacuum cleaner, in which the rotating brushes, motor, suction intake, dust bag and handle form a light trolley unit, follows the design of 1860 in which suction is combined with brushing.

(Concluded on page 182)

²⁸ "The Hydraulic" catalogue, Collection of Tom J. Smith, Jr.

²⁹ Vacuum Hydro Company, New York, catalogue, Collection of Tom J. Smith, Jr.

³⁰ As in the Electrolux vacuum cleaner.

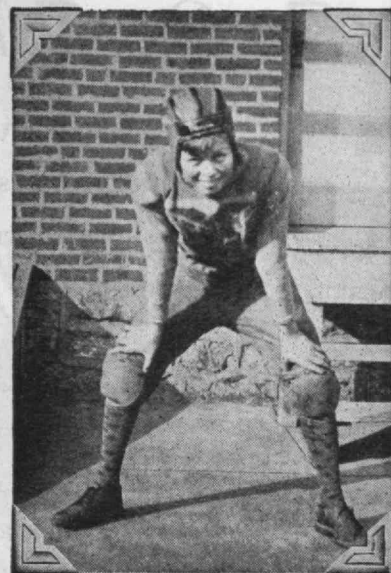
ALL THINGS HUMAN CHANGE...



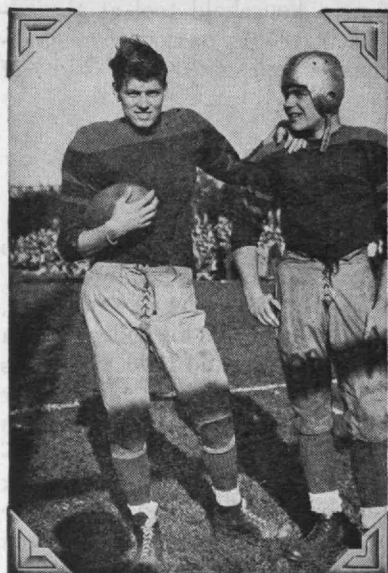
1933



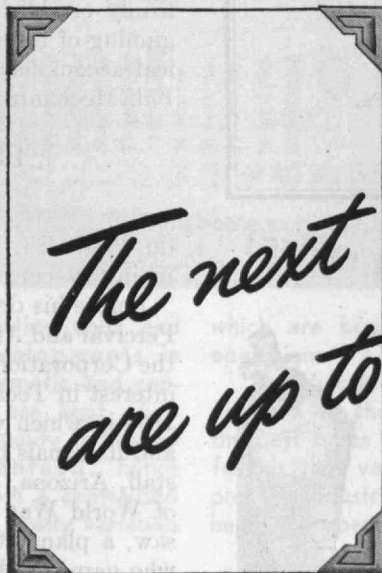
1940



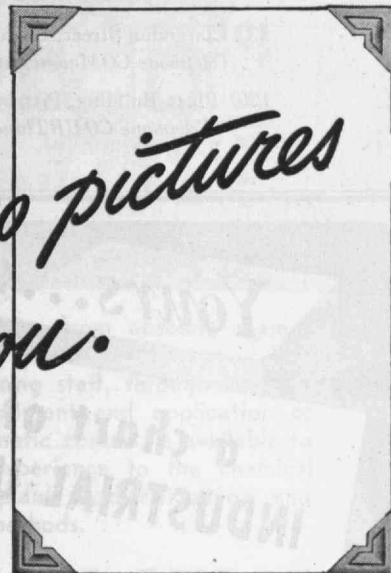
1943



1947



1950



1960

REMEMBER those golden moments—when he was only so high? His first bicycle? That seam-bursting pride when he made the team?

But his most fruitful years lie ahead. Rich with the promise of fine schooling—every advantage you can give him.

You've planned it that way. Just suppose, though, that you were suddenly no longer around to see it through.

Your insurance will take care of everything? Remember, though, family needs change with the times. And in order to keep your insurance program tailored to these shifting needs, it's

best to review your policies regularly. You'll find your New England Mutual Career Underwriter a great help. He's no farther away than your telephone. Why not call him now?

New England Mutual

Life Insurance Company of Boston

George Willard Smith, President Agencies in Principal Cities Coast to Coast
The First Mutual Life Insurance Company Chartered in America—1835

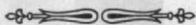
These Massachusetts Institute of Technology—and hundreds of other college men, represent New England Mutual:

Raymond P. Miller, '18, Salem Arthur C. Kenison, '19, Boston Blaylock Atherton, '24, Nashua Leland S. Person, '34, Rutland

WE HAVE OPPORTUNITIES FOR MORE MASSACHUSETTS INSTITUTE OF TECHNOLOGY MEN. WHY NOT WRITE DEPT. X-1 IN BOSTON?

For Over Fifty Years

ESTABLISHED REPUTATION
FOR DOING THE BEST WORK
IN THE SHORTEST TIME AND
AT THE LOWEST COST



LORD ELECTRIC COMPANY INCORPORATED

ELECTRICAL CONSTRUCTION

10 Rockefeller Plaza, New York 20, N. Y.
Telephone CIRCLE 6-8000

131 Clarendon Street, Boston 16, Mass.
Telephone COMMONwealth 0456

1201 Plaza Building, Pittsburgh 19, Pa.
Telephone COURTland 1920



Here are valuable facts on actual applications of DRY ICE and CO₂ for every potential user of these vital materials—summarized from a recent Liquid survey. All applications listed are in practical use... Many of the wartime functions of DRY ICE and CO₂ have peacetime counterparts—perhaps in your industry.

Use this chart as a check-list for possible applications to your processes or problems... DRY ICE and CO₂ serve industry in many important ways including chilling lubricants, shrinking metals, packaging foods, processing oil, controlling paint quality, etc.

Ask for your copy of this free chart today... You'll find it helpful in many ways.

The Liquid Carbonic Corporation

3110 South Kedzie Avenue, Chicago 23, Illinois
Branches in Principal Cities of the United States and Canada

VACUUM IN THE HOME

(Concluded from page 180)

The easily portable vacuum cleaners gave an extraordinary opportunity to high pressure salesmanship. Going from door to door with his machine, the salesman sold his product chiefly on pay-as-you-go basis by which American mass production of all manner of goods—from the vacuum cleaner to the automobile and the house—became financially possible. The mail order houses, founded in the 1870's, also owe their tremendous growth to this credit system.

Four years after the specialists pronounced themselves skeptical, the light weight models had already become an American institution; in the mail order catalogs of 1917 they appear at the low price of \$19.45.

Earlier and more conspicuously successful than all other mechanical household appliances, the vacuum cleaner, which can be put away in any broom closet, made its way throughout the world. By 1929 the conservative *Encyclopedia Britannica* was able to state, "The light portable type is by far the most popular and represents 95 per cent of all vacuum cleaners in use." Except in America, its popularity greatly exceeds that of the mechanized washing machine. The vacuum cleaner firmly established itself as a household tool at the beginning of the period 1918 to 1940; a period of mechanical accomplishment which is well called the "Time of Full Mechanization."

TREND OF AFFAIRS

(Continued from page 152)

du Pont, '84, would be inscribed over one of the two main fore-courts.

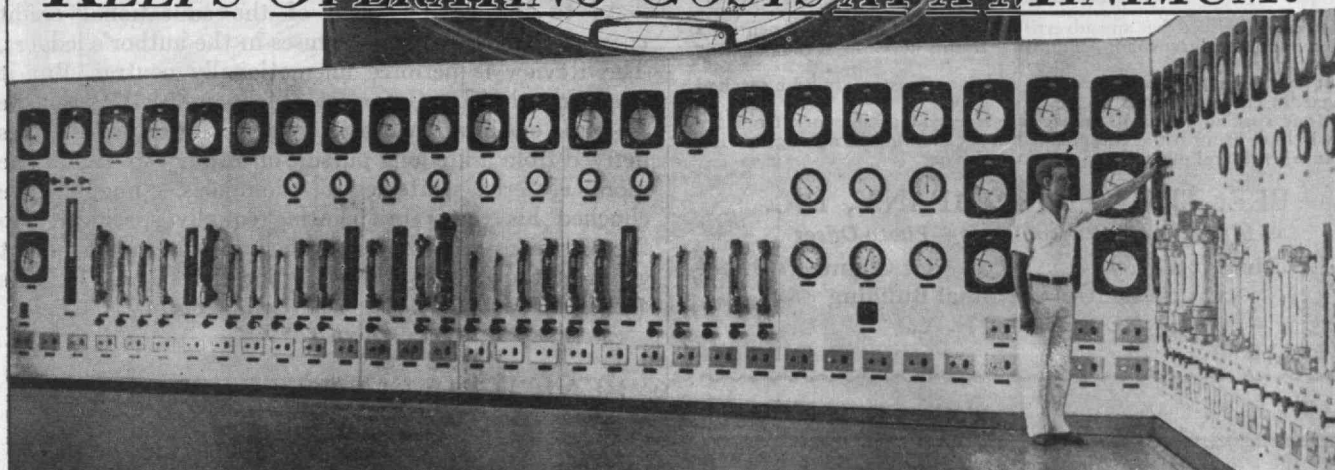
Before his death in 1900, Augustus Lowell's two sons, Percival and Abbott Lawrence, became his colleagues on the Corporation, respectively in 1885 and 1896. Percival's interest in Technology affairs was especially active after 1894 in which year his remarkable observations of Mars and its canals began at the Lowell Observatory at Flagstaff, Arizona, and where, coincident with the outbreak of World War I, he discovered and located, but never saw, a planet to be observed in 1932 by his successors who named it Pluto. From 1902 until his death in 1916, Percival Lowell was a member not only of several Corporation Visiting Committees but also of the Technology Faculty as non-resident professor of astronomy.

The Corporation span of Percival's younger brother, the late President Lowell of Harvard, extended nearly 47 years—the longest of any Lowell, with the single exception of Francis H. Williams, '73, who served from 1882 to 1935, the longest recorded for any member of the Institute's Corporation. He began under the administration of General Francis Amasa Walker; was on the Executive Committee five years during the Crafts administration; was on the Visiting Committee on Literature, History, and Political Economy from 1896 to 1912 when, at the request of President MacLaurin he joined the Visiting Committee on Architecture, an assignment which was to last until 1940. In the latter year, he became one of the original three members of the Visiting Committee on Student Activity created by President Compton, and from 1941 until his death in 1943 he served also as a mem-

(Concluded on page 184)

AUTOMATIC and CENTRALIZED CONTROL

KEEPS OPERATING COSTS AT A MINIMUM!



VULCAN-DESIGNED distillation units and plants incorporate the latest developments in instrumentation. Through such automatic and centralized control, operating costs are kept at a minimum, uniformity of product quality is insured and overall high yields are guaranteed. Entire plant operations are controlled from a centralized control station, thereby eliminating costly variables

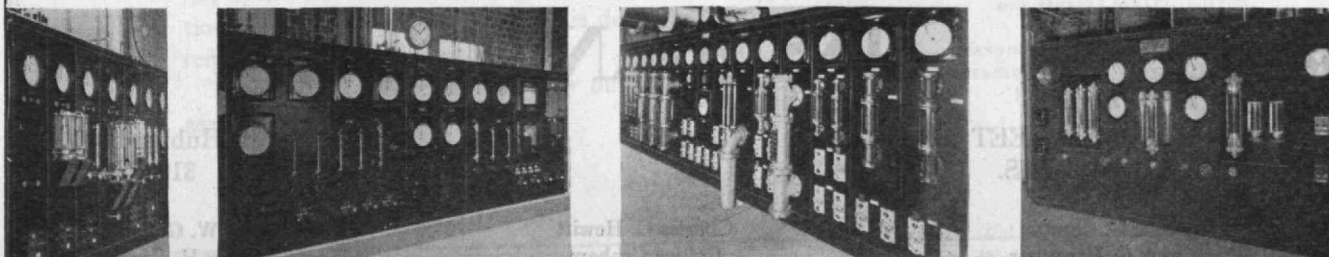
which are bound to arise from obsolete manual operations.

The Vulcan engineering staff, through long experience in the development and application of the best types of automatic control, is available to furnish this valuable experience to the chemical process industries for plant modernization and improved operational methods.

VULCAN

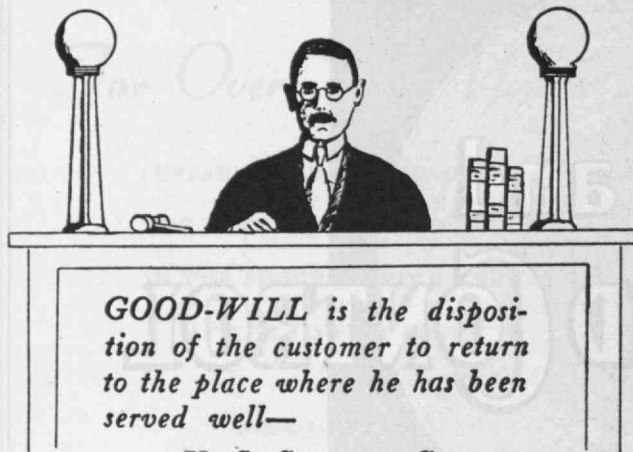
DISTILLATION EVAPORATION EXTRACTION

PROCESSES and EQUIPMENT



THE **VULCAN** COPPER & SUPPLY CO., CINCINNATI, OHIO

THE TRIAL IS NEVER OVER



*U. S. Supreme Court.
TO OUR FRIENDS*

We do not believe that any advertising copy man could have penned a neater and more trenchant definition than this decision of the Supreme Court.

It happens also to be the verdict which our customers have reached regarding their relations with us.

Your specific problems in technical reproduction work from the lowly blue print to the complicated offset printing of an engineering manual, will find their happy solution with us.

ELECTRO SUN COMPANY, INC.

Blue Prints — Photo Prints — Photo Offset

161 Washington Street

157 Chambers Street

Grand Central Terminal Building

NEW YORK, N. Y.

A. L. Weil '01

J. C. Duff '86

TREND OF AFFAIRS

(Concluded from page 182)

ber of the Visiting Committee on the Department of English and History.

From 1862 to 1943, therefore, that is to say throughout all but four of the 85 years of the Institute's history, one or another of these four Lowells, sometimes two at once and for a while three, were concerned in its governing body. Dr. Greenslet, in an epilogue in which he casts a trial balance between the accomplishments of the Lowells and those of another notable contemporary New England family, the Adamses, concluded that "in education the scales are weighted on the Lowell side." He points with pride to the "210 man-years of service and leadership" given by the Lowells to Harvard in slightly more than three centuries, and adds that their "vision and practical management contributed to the Lowell Institute and the Institute of Technology."

As to the completeness of the educational credit entries on behalf of the Adamses in the author's ledgers, The Review is perforce unemotionally neutral. But it does seem that Dr. Greenslet, able man-of-letters that he is — and one in whom are deftly blended rich philosophies derived from a life-long pursuit of unwary trout and the more esoteric strategies of dominoes — might have clinched his thesis by pointing equally specifically to the 124 man-years of vision and practical management given by the Lowells to the Corporation of M.I.T. in its chartered existence of less than a full century.

PENICILLIN AND STREPTOMYCIN

(Continued from page 156)

tion in enteric infections, as it is not affected by gastric juices and passes through the intestinal tract unchanged. Streptomycin can also be applied to the surface of infected body areas. In dry form it is quite stable; solutions deteriorate more rapidly unless kept in the refrigerator.

Streptomycin will not replace penicillin; rather, it will complement its famous predecessor. Penicillin's specific power has been established incontrovertibly in infections caused by Gram-positive bacteria, hence its proven performance in pneumonia, staphylococcic and streptococcic septicemias, gonorrheal infections, and so on. Streptomycin, on the other hand, is particularly

(Continued on page 186)

William H. Coburn, '11

William F. Dean, '17

William H. Coburn & Co.

INVESTMENT COUNSEL

68 Devonshire St.

Boston, Mass.

Boit, Dalton & Church INSURANCE

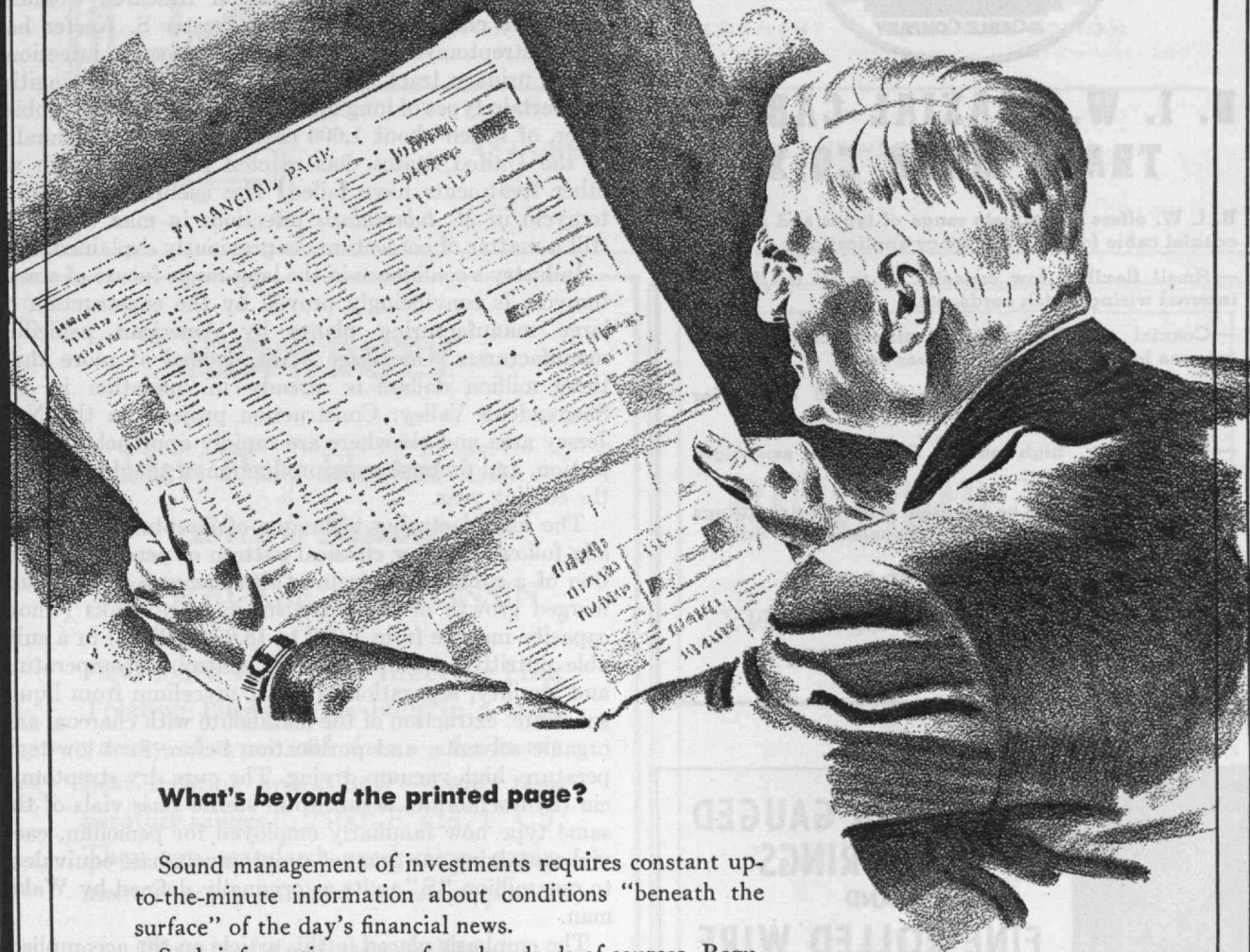
89 BROAD STREET
BOSTON, MASS.

Frederic C. Church
Frederick G. Farquhar

Charles C. Hewitt
Collins Graham

Hubbard
3100

John W. Gahan
Stanley H. King



What's beyond the printed page?

Sound management of investments requires constant up-to-the-minute information about conditions "beneath the surface" of the day's financial news.

Such information comes from hundreds of sources. Regular reports should be supplemented by special investigations. These should include visits to operating executives and examination of plants, to give insight at the source into the abilities of business managements.

All available information should be analyzed by specialists in order to glean the facts and trends which are vital to managing investments.

Few individuals today have time and facilities for gathering and analyzing the information necessary to keep abreast of changing conditions which may affect their securities.

Old Colony Trust Company's staff of competent specialists spend full time in investment research and interpretation. Their experienced judgment is developed to meet the requirements of all investors.

We shall be glad to explain how our services may be of assistance to you.



WORTHY OF YOUR TRUST

OLD COLONY TRUST COMPANY

ONE FEDERAL STREET, BOSTON

CHANNING H. COX, *Chairman of the Board*
T. JEFFERSON COOLIDGE, *Chairman, Trust Committee*
ROBERT CUTLER, *President*

Allied with THE FIRST NATIONAL BANK OF BOSTON



B. I. W. COAXIAL CABLES TRADE MARK CO-X

B. I. W. offers a complete range of types and sizes of coaxial cable for high frequency applications:

- Small flexible, low capacity (5 to 10 uuf/ft.) for internal wiring, patch cords, etc.
- Coaxial and Twin-axial weatherproof cables for antenna lead-in and other outdoor uses.
- Flexible standard synthetic insulated cables for electronic apparatus.
- Heavy duty, high power, flexible or semi-rigid transmission line.

All of the above can be supplied with special fittings and junctions for connections to panels or rigid lines.

**BOSTON INSULATED
WIRE AND CABLE COMPANY**
BOSTON 25, MASSACHUSETTS



PRECISION-GAUGED HAIRSPRINGS AND FINE ROLLED WIRE

PRECISION PRODUCTS COMPANY
WALTHAM, MASSACHUSETTS

ROBERT I. BRADLEY '20

PENICILLIN AND STREPTOMYCIN

(Continued from page 184)

efficacious in combating infections caused by members of the Gram-negative group of bacteria. The co-ordinated study conducted by the Committee on Therapeutic and Other Agents of the National Research Council, under the chairmanship of Dr. Chester S. Keefer has shown streptomycin to be effective in certain infections of the urinary tract, bacteremia, influenzal meningitis, and certain types of lung infections. Tularemia, or rabbit-fever, of which about 1,600 cases are reported annually in the United States, has reacted favorably when all other treatments have failed. The usefulness of streptomycin in *M. tuberculosis* infections in man is largely still a matter of conjecture, as previously explained.

Industry's confidence in the long-range future of streptomycin is convincingly proved by the construction of large manufacturing plants by American penicillin manufacturers. One large plant, valued at more than three million dollars is already in operation in the Shenandoah Valley. Construction projects in the New Jersey area and elsewhere are rapidly approaching completion, and promise mass production of the drug within the coming year.

The manufacturing technique of streptomycin generally follows the now classical pattern of penicillin: selection of a productive strain of *Streptomyces griseus*, submerged growth of the organism in large tanks (whose capacity may be from 1,000 to 15,000 gallons) in a suitable nutritive medium, careful control of temperature and sterility, separation of spent mycelium from liquid substrate, extraction of the metabolite with charcoal and organic solvents, and purification before final low-temperature, high-vacuum drying. The pure dry streptomycin (hydrochloride) is put up in sterile glass vials of the same type now familiarly employed for penicillin, each vial containing one gram of streptomycin base equivalent to one million "S" units as originally defined by Waksman.

The emphasis placed in this article on the accomplishments of the microbiologists in developing new antibiotics should in no way minimize the contributions made by chemists and by engineers. To be sure, much credit is due to the soil-microbiologist, who in the last analysis seeks means of bringing the resources of the soil popula-

(Concluded on page 188)

L. N. BARRY CO., Inc.

Specialists in the Control of

NOISE

VIBRATION

IMPACT

179 Sidney Street, Cambridge, Massachusetts

TELEPHONE: ELIOT 0861, 0140

ENGINEERING



INSTALLATION



MANUFACTURING



PRECISION INSTRUMENTS
GYROSCOPES — GYROSCOPIC DEVICES
DESIGN • DEVELOPMENT • PRODUCTION

437 CHERRY STREET, WEST NEWTON 65, MASS.

TRADE MARK
HEVI DUTY
REGISTERED, U. S. PAT. OFFICE

Hevi Duty Electric Co.
Electric Furnaces

MILWAUKEE, WISCONSIN

Hevi Duty Precision Electric Heat Treating Furnaces are built in a large variety of types and sizes — for many heat treating operations — with temperature ranges to 2500° F. (1371° C.). They are standard production equipment in many national industrial plants.

Write for descriptive bulletins

HAROLD E. KOCH '22, President

ELTON E. STAPLES '26, District Manager, Cleveland

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES **HEVI DUTY** ELECTRIC EXCLUSIVELY
MILWAUKEE 1, WISCONSIN

The
RUMFORD PRESS

CONCORD
NEW HAMPSHIRE



WHERE
Printing
IS STILL A CRAFT

HAROLD J. RYAN, INC.

Air Conditioning

101 PARK AVENUE

NEW YORK 17, N. Y.

WILLIAM D. NEUBERG COMPANY

Chemicals

GRAYBAR BUILDING 420 LEXINGTON AVE.

NEW YORK 17 N. Y.

TELEPHONE LEXINGTON 2-3324



Transits and Levels are used on all largest works and by U. S. Govt. for utmost precision. Rental Insts. New catalog, just issued, sent gratis. A souvenir plumb-bob sent for 3¢ postage.

BUFF & BUFF CO. Boston 30, Mass.

Henry A. Buff '05

SWISS AUTOMATICS

Rebuilding and Tooling Service

We have trained personnel and facilities for complete rebuilding and tooling of your Swiss Automatics and other type Swiss Machines.

YOUR INQUIRIES ARE INVITED

BORIS M. VOLYNSKY MFG. CO., Inc.

311 West 66th Street

New York 23, N. Y.

— STEEL —

HOT AND COLD ROLLED

Stahleker Steel Corp.

Second and Binney Sts., Kendall Sq., Cambridge 42, Mass.

Telephone Trowbridge 1440

WALLACE BLANCHARD, '16, Treasurer

for
In
NEW
ENGLAND

REPRODUCTION PROCESSES

Blueprints · Photostats

Ozalid Whiteprints

Photo-lithography

SPAULDING-MOSS CO.

42 Franklin St. Boston 10, Mass.

PENICILLIN AND STREPTOMYCIN

(Concluded from page 186)

tion to the service of man by isolating and controlling such useful organisms as the *Penicillia* and *Actinomyces*. However, only through knowledge of the chemistry of penicillin was it possible to incorporate in the fermentation broth, which provides nourishment for the growth of the microbial organism, substances which already contain portions of the characteristic penicillin molecule. These chemical substances, which are referred to as penicillin precursors, are speeding up many fold the effectiveness of bio-synthesis of penicillin by the molds.

In the case of streptomycin, extensive research in nutrition media demonstrated that *Streptomyces griseus* thrives particularly well on a diet of meat extract, while *Penicillium* grows profusely with proteins of vegetable origin. Chemical engineers have provided novel designs for fermentors, filters, extractors, and low-temperature drying equipment; and many ingenious and delicate control instruments have been developed to assure safe and efficient processing of the sensitive substances obtained from mold metabolism.

Microbiologists, chemists, physicists, and engineers working as a team, with pharmacologists and physicians are sure to produce new miracles to help mankind in the years to come.

LOW TEMPERATURE REFRIGERATION

(Continued from page 162)

because the magnetic field produced by the current itself will destroy the superconducting state if it exceeds a certain critical value at a given temperature. This fact precludes the possibility of transmitting large amounts of electrical energy over a thin wire kept at low temperature.

Future research now being planned is expected to shed light not only upon these little understood phenomena but also upon the important general problem of the solid state. The possibility that superconductors may play a useful role in detecting minute quantities of radiant energy is also being investigated experimentally.

The helium cryostat⁴, recently developed at M.I.T., is expected to give a considerable impetus to low temperature studies because of the flexibility of operation over a wide temperature range. This cryostat provides an experimental chamber which can be cooled to any temperature level from ambient to within four degrees F. of the absolute zero. Gaseous helium, the refrigerant, is circulated by a compressor at relatively low pressures. The stream is divided into three fractions, the first two of which are expanded with the performance of useful work at the indicated temperature levels, and the third isenthalpically (at constant heat content) at the boiling point of liquid helium, -452° F. If a still lower temperature is desired, operating conditions are adjusted for the production of a quantity of liquid helium which gathers on the floor of the experimental chamber. The rate of production is approximately three quarters of a liter per hour. When a sufficient quantity has accumu-

⁴ Collins, S. C., "A Helium Cryostat." *Phys. Rev.* 70, 98, July 1-15, 1946.

(Concluded on page 190)

FOR IMMEDIATE DELIVERY
Odd and Large Sizes a Specialty
1/8" to 72"

**LARGEST AND
MOST COMPLETE STOCK
on Atlantic Seaboard**

Shop Facilities for: Threading and Weld-
ing — All Sizes of Pipe — Welding
Fittings and Flanges, 1/2" to 24" Dia.

ALSO RECONDITIONED PIPE — VALVES —
FITTINGS FOR TEMPORARY SERVICE

If It's Made — Ask ALBERT!

● **PIPE**

Electric Weld
Seamless
Spiral Weld
Lap Weld
Butt Weld
Steel—Wrought Iron
Shore-Dredge

● **VALVES**

Iron Body
Forged Steel
Cast Steel
and
Special
Alloys

● **FITTINGS**

Welding
Tube Turns
Fabricated
Cast Iron
Forged Steel
Cast Steel Dresser
Malleable Victaulic

● **PILING**

ARMCO
Youngstown
Points — Sleeves
all Specifications
S. G. ALBERT '29
Treasurer

ALBERT PIPE SUPPLY CO., Inc.

No. 13th & Berry Streets, Brooklyn, N. Y. EVergreen 7-8100

TECHNOLOGY MEN . . .

Walker Memorial Technology's Social Center

is the

**HOME FOR YOUR
CLASS FUNCTIONS**

MENUS SUBMITTED ON REQUEST

Address: A. W. BRIDGES

WALKER MEMORIAL DINING SERVICE

M. I. T.

Cambridge 39, Massachusetts

PEQUOT EXTRAS



Projecting Size Tabs

For quick identification. No fumbling through sheets on shelves. Each size has its own color tab.



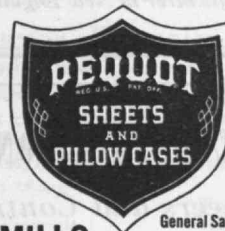
Double-Tape Selvages

For extra strength and straightness. A double row of extra heavy woven tape selvaage.



Certified Impartial Testing

U. S. Testing Co. regularly tests Pequots bought in the open market, finds them always *above* U. S. Govt. standards.



YOUR
ASSURANCE

OF
DEPENDABLE
QUALITY

PEQUOT MILLS

General Sales Offices: Empire State Bldg.
New York 1, N. Y.
Boston • Chicago • San Francisco

McCREERY and THERIAULT

Building Construction

126 NEWBURY STREET

BOSTON, MASS.

LOUIS LONG, JR., PH.D.

CONSULTING CHEMIST

REPORTS • SURVEYS • RESEARCH

53 STATE STREET, BOSTON, MASS.

LOW TEMPERATURE REFRIGERATION

(Concluded from page 188)

lated, the compressor is converted into a vacuum pump, by turning appropriate valves. Evaporation of the liquid helium under reduced pressure quickly brings the temperature down to about -456°F . Any gas can be liquefied and delivered to the exterior.

In 1926 Giauque⁵ and Debye⁶ independently predicted that, at very low temperatures, the internal energy of certain paramagnetic salts at a given temperature and in a strong magnetic field would decrease substantially as the intensity of the magnetic field is decreased. The experiment was carried out successfully in 1933. Gadolinium sulphate placed in a magnetic field of 8000 gauss and cooled by helium, boiling under reduced pressure, suffered so great a loss of energy that its temperature fell to within one quarter of a degree of absolute zero when the magnetic field was suddenly removed. In later experiments, temperatures within a few thousandths of a degree of absolute zero were attained. As a method of cooling, adiabatic demagnetization of paramagnetic salts is of interest only in the region below the boiling point of helium, but scientifically, at least, it is of very great importance because it makes available a temperature level not otherwise attainable at the present time.

The Research Laboratory of Electronics has recently acquired a second helium cryostat of the type described above. With the facilities already in existence in the Magnet Laboratory and a supply of liquid helium, it will be possible to perform experiments at temperatures very close to the absolute zero by the adiabatic demagnetization of certain salts. The Department of Physics is preeminently equipped for the study of low temperature physical problems.

For several years, low temperature calorimetric measurements have been carried out in the Department of Chemistry from room temperatures to that at which hydrogen solidifies.

In the Laboratory of Cryogenic Engineering of the Department of Mechanical Engineering, apparatus is being assembled for the further study and development of low temperature equipment such as turbo expanders and air rectifiers, for the study of some of the thermodynamic properties of air at low temperatures, and the effect of low temperatures upon the mechanical properties of certain materials.

Much of the equipment will be available for laboratory instruction of students interested in low temperatures.

⁵ Giauque, W. F., "A Thermodynamic Treatment of Certain Magnetic Effects," *Jour. Am. Chem. Soc.*, 49, 1864 (1927).

⁶ Debye, P., "Einige Bemerkungen zur Magnetisierung bei Tiefer Temperatur," *Ann. Physik*, 81, 1154 (1926).

J. C. CORRIGAN CO.

Conveyers

Engineers • Manufacturers • Erectors

Coal Handling Systems

Materials Handling Equipment

Portable Conveyers

Distributors for

Jeffrey Manufacturing Co.

Jeffrey Parts Carried in Boston Stock

41 Norwood Street, Boston, Mass.

Tel. GENEva 0800

MONSANTO CHEMICAL COMPANY

Merrimac Division

EVERETT
MASSACHUSETTS

*The largest and oldest
chemical manufacturer in New England*

LEONARD CONSTRUCTION COMPANY

Engineers and Contractors

SINCE 1905

IN ALL THE AMERICAS AND FAR EAST

37 South Wabash Ave. 420 Lexington Ave.
Chicago New York City

Ingenieros S.A. de C.V., Mexico

PREPARATORY SCHOOLS FOR BOYS

CHAUNCY HALL SCHOOL

Founded 1828. The School that confines itself exclusively to the preparation of students for the Massachusetts Institute of Technology.

FRANKLIN T. KURT, Principal

553 Boylston Street, Boston, Mass.

HUNTINGTON SCHOOL FOR BOYS

Grades Nine to Twelve.

Thorough preparation for entrance to M.I.T.
and other technical schools.

Regular and summer courses.

320 Huntington Ave., Boston

Tel. Kenmore 1800

PROFESSIONAL CARDS

JACKSON & MORELAND

Engineers

Public Utilities — Industrials
Railroad Electrification
Design and Supervision — Valuations
Economic and Operating Reports

BOSTON

NEW YORK

H. K. BARROWS, '95

M. Am. Soc. C. E.

CONSULTING HYDRAULIC ENGINEER

*Hydro-electric Developments — Water Supplies. Reports, Plans,
Supervision. Advice, Appraisals*

6 BEACON STREET

BOSTON, MASS.

EADIE, FREUND AND CAMPBELL

CONSULTING ENGINEERS

500 FIFTH AVENUE NEW YORK 18, N. Y.

Plans and Specifications — Examinations and Reports

Power, Heating, Ventilating, Electric, Plumbing,
Sprinkler, Refrigerating, Elevator Installations, etc.,
in Buildings and Industrial Plants

J. K. CAMPBELL, M. I. T. '11

STARKWEATHER ENGINEERING CO.

INCORPORATED

*Engineers and Contractors for Pumping Plants
Boiler and Power Plants, Cooling Water
and Heat Recovery Systems*

246 WALNUT STREET, NEWTONVILLE

BIGelow 8042

Wm. G. Starkweather, M.E.

J. B. Starkweather, B.S.

Cornell '92

M.I.T. '21

H. A. KULJIAN & CO.

CONSULTANTS • ENGINEERS • CONSTRUCTORS

Specialists in

UTILITY, INDUSTRIAL and CHEMICAL FIELDS

1518 WALNUT STREET

PHILADELPHIA, PA.

H. A. KULJIAN '19

FABRIC RESEARCH LABORATORIES

INCORPORATED

*Research, Development and Consultation
for Textile and Allied Industries*

665 BOYLSTON STREET

Boston, Mass.

W. J. HAMBURGER, '21

K. R. Fox, '40

E. R. KASWELL, '39

GILBERT ASSOCIATES, INC.

ENGINEERS AND CONSULTANTS

Malcolm G. Davis '25, Vice President
F. E. Drake '05

Allen W. Reid '12
E. C. Edgar '35

Steam, Hydro, Diesel Power Plants; Industrial Structures;
Plant Safety, Labor Relations, Utility Rates, Valuations,
Reports; Large Scale Purchasing; Industrial Laboratory

Reading, Pa.

New York

Washington, D. C.

Philadelphia, Pa.

61 Broadway

Mexico City

FAY, SPOFFORD & THORNDIKE

Engineers

Airports — Bridges — Water Supply and Sewerage
Port and Terminal Works — Fire Prevention

INVESTIGATIONS

DESIGNS

SUPERVISION OF CONSTRUCTION

BOSTON

NEW YORK

WALLACE CLARK & COMPANY

CONSULTING MANAGEMENT ENGINEERS

SINCE 1920

Planning for Research and Development,
Sales, Engineering, Production, Finance,
Industrial Relations, Overall Management

521 FIFTH AVENUE

NEW YORK 17, N. Y.

Booklet describing our services and experience will be sent on request

MAURICE A. REIDY

Consulting Engineer

BRIDGES

BUILDINGS

STRUCTURAL DESIGNS

FOUNDATIONS

CONSTRUCTION CONSULTANT AND ARCHITECTURAL ENGINEER

Estimates and Appraisals

101 TREMONT STREET

BOSTON, MASS.

THE COSMA LABORATORIES CO.

1545 East 18th Street

Cleveland 14, Ohio

Chemical Analysis — Testing — Consulting Engineering
Testimony and Research

H. SBYMOUR COLTON, M.I.T. '21

R. W. FRISCHMUTH, Case '38

Director

Assistant Director

MORAN, PROCTOR, FREEMAN & MUESER

CONSULTING ENGINEERS

420 LEXINGTON AVENUE

NEW YORK 17, N. Y.

Foundations for Buildings, Bridges and Dams;
Tunnels, Bulkheads, Marine Structures, Soil Studies and Tests;
Reports, Design and Supervision

Pardo, Proctor, Freeman & Mueser
Ingenieros Consultores
Ap. Correos 614, Caracas, Venezuela

WILLIAM H. MUESER, '22
GEORGE T. GILMAN, '23

PALMER RUSSELL CO.

Realtors

Real Estate Brokers

Property Management

Appraisals and Mortgages

1320 BEACON STREET

BROOKLINE, MASS.

Edgar P. Palmer '25

William W. Russell '22

FRANK MASSA

Electro-Acoustic Consultant

DEVELOPMENT — PRODUCTION DESIGN — PATENT ADVISOR

Loud Speakers — Microphones — Sound Powered Telephones
Supersonic Generators and Receivers
Electro-Acoustic Instruments
Underwater Sound

3393 DELLWOOD ROAD

CLEVELAND HEIGHTS, OHIO

AREA PLACEMENT CHAIRMEN FOR MASSACHUSETTS INSTITUTE OF TECHNOLOGY

*Each man listed below will have information about positions for
M. I. T. Graduates who want to locate in his particular area*

ALABAMA

ROBERT C. STOBERT '12, P. O. Drawer 1392, Birmingham

ARKANSAS

LESLIE A. JACKSON '09, Manager, Little Rock Municipal Water System, Little Rock

CALIFORNIA

EDWARD J. RILEY '09, Graybar Electric Company, Inc., Ninth and Howard Streets, San Francisco

FORD W. SAMMIS '28, 433 South Spring Street, Los Angeles 13

COLORADO

ALFRED E. PERLMAN '23, Denver and Rio Grande Western Railroad Company, Denver 1

CONNECTICUT

FREDERICK W. GREEN '32, Nash Engineering Company, Wilson Avenue, South Norwalk (Bridgeport area)

GEORGE L. MYLCHREEST '10, 238 Palm Street, Hartford

CHARLES E. SMITH '00, Railroad Office Building, New Haven

DISTRICT OF COLUMBIA

WILLIAM C. MEHAFFEY '17, 1630 North Greenbrier Street, Arlington, Virginia

FLORIDA

GEORGE W. SIMONS '15, Hildebrandt Building, Jacksonville

CLARENCE P. THAYER '23, 4212 N. W. Sixth Avenue, Miami

FRANKLIN O. ADAMS '07, 305 Morgan Street, Tampa

GEORGIA

WILLIAM E. HUGER '22, 11 Marietta Street, N.W., Atlanta 1

ILLINOIS

ROBERT W. CLYNE '30, American Steel Foundries, 400 North Michigan Ave., Chicago 11

INDIANA

FRANK C. BALKE '14, Balke and Krauss Company, 427 West Market Street, Indianapolis

KANSAS

FRED C. KOCH '22, Winkler-Koch Engineering Co., 335 West Lewis Street, Wichita

KENTUCKY

TINSLEY W. RUCKER III '31, The Crescent Panel Company, 32d and Market Streets, Louisville 12

LOUISIANA

THEODORE O. HOTARD '12, 221 Pelican Avenue, New Orleans 14

MAINE

FRANK A. KNIGHT '38, Eastern Corporation, Bangor

LEWIS D. NISBET '09, 44 Montrose Avenue, Portland

MARYLAND

GEORGE W. SPAULDING '21, 1605 Lexington Building, Baltimore 1

MASSACHUSETTS

ROBERT F. BURNETT '10, 85 North Main Street, Fall River

A. RUSSELL PIERCE, JR. '31, Palmer Scott Boatyard, New Bedford

LYNN WETHERILL '25, High Voltage Bushing Engineering Division, General Electric Company, 100 Woodlawn Avenue, Pittsfield

ALBERT D. KING '32, De Bell and Richardson, 3 Post Office Alley, Springfield

MICHIGAN

ADAM K. STRICKER '29, 1227 Bishop Road, Grosse Point Park, Detroit

MINNESOTA

LELAND CLAPPER '09, 5600 London Road, Duluth

CHARLES W. DREW '19, Minneapolis-Honeywell Regulator Company, Minneapolis

MISSOURI

HARRY L. HAVENS '09, Havens Structural Steel Company, 1713 Crystal, Kansas City

WESLEY W. WEDEMAYER '30, Wedemeyer and Hecker, Architects, 319 North Fourth Street, St. Louis 2

MONTANA

WALTER R. C. RUSSERT '18, Anaconda Copper Company, Butte

NEBRASKA

JOHN M. HANLEY '30, Northern Natural Gas Company, Aquila Court Building, Omaha

NEW HAMPSHIRE

BLAYLOCK ATHERTON '24, 142 Main Street, Nashua

NEW JERSEY

GEORGE A. CHUTTER '21, 109 Central Avenue, Glen Rock (Newark area)

NEW YORK

ANDREW F. ALLEN '12, State Department of Health, Albany

THOMAS H. SPELLER '29, General Engineering Company, 785 Hertel Avenue, Buffalo 7

JOHN C. FRUIT '02, Equitable Life Assurance Society of U. S., 393 7th Avenue, New York 1

RAYMOND G. BROWN '16, Comstock and Westcott Inc., Niagara Falls

C. KING CROFTON '22, 1132 Lincoln-Alliance Bank Building, Rochester 4

A. J. TACY '27, Room 645, Building No. 2, General Electric Company, Schenectady

J. MURRAY HASTINGS '13, 606 Hills Building, Syracuse

OHIO

JAMES B. HOLDEN '30, 276 Sundale Road, Akron

KENNETH A. WRIGHT '19, Johnson Service Company, 1905 Dunlap Street, Cincinnati 14

CHARLES B. ROWLEY '12, Charles Bacon Rowley and Associates, Keith Building, Cleveland

JAMES H. BLODGETT '20, Superintendent, Division of Sewage Treatment, Columbus

EUGENE HERZOG '27, 26 Cliff Street, Dayton

CHARLTON P. WHITTIER '27, Owens-Illinois Glass Company, P. O. Box 1035, Toledo 1

OKLAHOMA

W. J. SHERRY '21, 804 Kennedy Building, Tulsa

OREGON

ROBERT E. CUSHMAN '06, 618 N. W., Front Street, Portland 9

PENNSYLVANIA

PERCY TILLSON '06, 3003 North Front Street, Harrisburg

EDWARD J. HEALY '23, Philadelphia Brewing Company, 6th and Clearfield Streets, Philadelphia 33

HAROLD L. LANG '09, Carnegie Institute of Technology, Pittsburgh 13

G. C. WILSON '15, 907 East King Street, Lancaster

LOUIS MORSE '96, York Corporation, Roosevelt Avenue, York

RHODE ISLAND

DONALD G. ROBBINS '07, c/o International Braid Company, 47 Charles Street, Providence

TENNESSEE

DANA M. WOOD '06, 619 Union Building, TVA, Knoxville

DONALD W. SOUTHGATE '11, Nashville Trust Building, Nashville 3

TEXAS

JONATHAN A. NOYES '12, 1914 Commerce Street, Dallas 1

JOSEPH H. McEVoy '21, 202 McGowen Avenue, Houston 6

UTAH

GEORGE M. GADSBY '09, Utah Power and Light, Kearns Building, Salt Lake City

VIRGINIA

DONALD N. FRAZIER '11, 1226 Mutual Building, Richmond

WASHINGTON

HOLLAND H. HOUSTON '24, 215 Fifth Street, Olympia (Seattle area)

HOMER C. BENDER '09, 921 East 19th Street, Spokane

WISCONSIN

PHILIP N. CRISTAL '17, 720 East Wisconsin Avenue, Milwaukee 2

TECHNOLOGY MEN IN ACTION

THE ALUMNI FUND — ITS PROBLEMS AND GROWTH

Painless Giving

"It is not only the rich man who gets, in effect, a rebate from the government on money he gives to good causes. Everybody who makes out a full individual income tax return gets one. A contribution *always* costs less than it appears to at first blush."

So says J. K. Lasser, author of *Your Income Tax*, annual best seller, in an article in the December issue of *Harper's*. Mr. Lasser is not talking generalities. He gives fact and figure to back up his statements. From his tables it is apparent that a man with a net income of \$4,000, after exemptions, can make a contribution at a cost of 79 cents a dollar; and the cost drops steadily until it is only 17 cents for a man in the \$100,000 bracket.

Of even greater interest, however, is Mr. Lasser's analysis of the giving of securities instead of cash. In some cases this may be done at an actual saving to the donor, and in any event, if the securities have increased in market value, at much less cost than the same gift in cash. Furthermore, corporations as well as individuals may give at "bargain rates," since a corporate gift of securities not only saves the 38 per cent normal tax and surtax, but also escapes payment of the 25 per cent tax on capital gains.

"Nor is this all. Some gifts by corporations can be moved out of the category of 'contributions' entirely and deducted in full — 100 per cent — as necessary and ordinary business expenses. To qualify in this respect the money must be handed over in the reasonable expectation that it will bring proportional benefits to the donor's business." This would hardly seem applicable to Alumni Fund giving, but there are many other needs of the Institute where this thinking might well be pertinent.

Mr. Lasser's article is well worth reading by anyone who proposes to take advantage of the tax deductions which are allowed him. It will be an eye opener for many who are unfamiliar with "... the various authorized devices which may be adopted, under the present tax laws, to make charity comparatively painless to the giver, without even a faint odor of unethical tax avoidance. The Treasury and the courts have done far more than most people realize to ease the way for qualified institutions which sorely need gifts."

TECHNOLOGY MEN IN ACTION

M.I.T. MEN AT WAR

FOR DISTINGUISHED SERVICE

A partial listing of decorations received by M.I.T. Alumni in World War II . . . To be concluded in an early issue.

CONGRESSIONAL MEDAL OF HONOR

U.S.A.

- 1924 Doolittle, James H., *Lt. Gen.*
1940 Zeamer, Jay, Jr., *Lt. Col.*

DISTINGUISHED SERVICE CROSS

U.S.A.

- 1911 Kenney, George C., *Gen.*
1913 Jones, Albert M., *Maj. Gen.*
1934 *Emery, Robert M., *Lt.*
1942 Kellogg, William W., *Capt.*

DISTINGUISHED SERVICE MEDAL

U.S.A.

- 1907 Fredendall, Lloyd R., *Lt. Gen.*
1911 Kenney, George C., *Gen.*
1913 Jones, Albert M., *Maj. Gen.*
1914 Waits, Alden H., *Maj. Gen.*
1917 Groves, Leslie R., Jr., *Maj. Gen.*
Hegenberger, Albert F., *Maj. Gen.*
1921 Donovan, Richard, *Maj. Gen.*
Moses, Raymond G., *Brig. Gen.*
Newman, James B., Jr., *Brig. Gen.*
Noce, Daniel, *Maj. Gen.*
Scott, Stanley L., *Maj. Gen.*
1922 Browning, Albert J., *Brig. Gen.*
Hoge, William M., *Maj. Gen.*
Johns, Dwight F., *Brig. Gen.*
1923 Christmas, John K., *Brig. Gen.*
Covell, William E. R., *Maj. Gen.*
Deitrick, Carroll H., *Col.*
Randall, Russell E., *Brig. Gen.*
Teale, Willis E., *Col.*
1924 Doolittle, James H., *Lt. Gen.*
Henry, Stephen G., *Maj. Gen.*
McSherry, Frank J., *Brig. Gen.*
Stevenson, Thomas T., *Col.*
1925 Gow, Ralph F., *Col.*
Holman, Jonathan L., *Brig. Gen.*
1928 Kelsey, Benjamin S., *Col.*
1933 Love, Robert M., *Col.*
1939 Leghorn, Richard S., *Lt. Col.*
1940 Dickson, John R. V., *Col.*
1941 Katz, Leonhard, 2nd *Lt.*

U.S.N.

- 1913 Smith, Edward H., *Rear Adm.*
1917 Sherman, Forrest P., *Vice Adm.*
Sullivan, William A., *Commo.*
1924 *Royal, Forrest B., *Rear Adm.*
1928 Johnson, Ellis A., *Comdr.*
1929 *Kiefer, Dixie, *Commo.*
1934 Robinson, James M., *Comdr.*

DISTINGUISHED FLYING CROSS

U.S.A.

- 1911 Kenney, George C., *Gen.*
1917 Hegenberger, Albert F., *Maj. Gen.*
1923 Randall, Russell E., *Brig. Gen.*
1926 Warburton, Ernest K., *Col.*
1928 Kelsey, Benjamin S., *Col.*
1936 Michel, Norman K., *T. Sgt.*
1938 Dent, Frederick R., Jr., *Col.*
1939 Kittredge, Harry C., Jr., 2nd *Lt.*
Leghorn, Richard S., *Lt. Col.*
1941 *Campbell, Thomas C., Jr., *Capt.*
Fletcher, Arthur A., Jr., *Lt. Col.*
1942 Candy, William R., *Lt.*
Goldis, Alfred, *Capt.*
*Kunz, Robert C., *Maj.*
Leghorn, Kenneth M., *Maj.*
1943 Herzog, Frederick C., Jr., 1st *Lt.*
Lydtotes, George A., 1st *Lt.*
Robinson, Gwynn H., *Capt.*
2-44 Phillips, W. John, Jr., *Lt.*
West, Alden A., *Lt.*
10-44 Gray, Arthur, Jr., 2nd *Lt.*

U.S.N.

- 1940 Nelson, Robert S., *Lt.*
1942 Connolly, Thomas F., *Comdr.*
McChinnis, Carl L., *Lt. (j.g.)*
10-44 Guptill, Frank E., Jr., A.R.M.2c

AIR MEDAL

U.S.A.

- 1922 Brokaw, Charles E., *Col.*
1923 Randall, Russell E., *Brig. Gen.*
1928 Kelsey, Benjamin S., *Col.*
1933 Love, Robert M., *Col.*
1936 Merrill, Bushnell D., *Capt.*
1937 Garber, Alvin J., 1st *Lt.*
1938 Dent, Frederick R., Jr., *Col.*
*Guttel, John, *Lt.*
Mehren, Bernard W., 1st *Lt.*
1939 Kapchus, John F., *Capt.*
Leghorn, Richard S., *Lt. Col.*
Wexler, Harry, *Maj.*
1940 Meyer, Herman L., *Capt.*
Pomeroy, William W., *Lt.*
Schuerch, Conrad, Jr., *Lt.*
Weinbrenner, George R., *Lt. Col.*
1941 *Campbell, Thomas C., Jr., *Capt.*
Katz, Leonhard, 2nd *Lt.*
MacLeod, John H., Jr., *Maj.*
1942 Candy, William R., *Lt.*
Field, Russel W., Jr., *Lt.*
Fraser, Wilton M., *Capt.*
Goldis, Alfred, *Capt.*
Jones, Jack J., *Maj.*
Kellogg, William W., *Capt.*
*Kunz, Robert C., *Maj.*
Leghorn, Kenneth M., *Maj.*
Weingarten, John, *Lt.*
Wells, Jackson B., Jr., 2nd *Lt.*
1943 Hartvig, Douglas M., *Lt.*
Herzog, Frederick C., Jr., 1st *Lt.*
Lydtotes, George A., 1st *Lt.*
Robinson, Gwynn H., *Capt.*
Shamban, Melvin S., 2nd *Lt.*
2-44 Freeman, Roger M., Jr., 1st *Lt.*
Looker, Edward C., Jr., *Lt.*
Phillips, W. John, Jr., *Lt.*
Van Valen, Maxwell, 1st *Lt.*
West, Alden A., *Lt.*
Wiggins, Richard F., *Capt.*
10-44 Donahue, Joseph M., *Lt.*
Gray, Arthur, Jr., 2nd *Lt.*
Knight, Richard A., 2nd *Lt.*
6-45 Amadon, Roger M., *Lt.*
Kessler, Ira, 2nd *Lt.*
McChrystal, Richard G., *Capt.*
Maley, William B., 2nd *Lt.*
Pearson, Donald L., *Lt.*
Wood, George A., Jr., 1st *Lt.*

U.S.N.

- 1940 Livingston, Chester G., *Lt.*
Nelson, Robert S., *Lt.*
10-44 Guptill, Frank E., Jr., A.R.M.2c

U.S.M.C.

- 1943 Willecox, Julian, *Capt.*

NAVY CROSS

U.S.N.

- 1917 Sherman, Forrest P., *Vice Adm.*
1920 Hayler, Robert W., *Rear Adm.*
1922 Beatty, Frank E., *Rear Adm.*
Kitts, Willard A., 3d, *Adm.*
1928 Danis, Anthony L., *Capt.*
1929 *Kiefer, Dixie, *Commo.*
1930 Buracker, William H., *Capt.*
1931 Ekstrom, Clarence E., *Capt.*
1932 *Burr, Leland M., Jr., *Lt. Comdr.*
1939 Macomber, Brainerd T., *Lt. Comdr.*
1940 Pieczentkowski, Herman A., *Capt.*
1941 Sieglaff, William B., *Comdr.*
1942 Bennett, Carter L., *Comdr.*

SILVER STAR

U.S.A.

- 1914 Wood, John E., *Brig. Gen.*
1922 Acker, Lewis F., *Col.*
Bainbridge, William W., *Capt.*
1923 Slaughter, Willis R., *Col.*
1924 Doolittle, James H., *Lt. Gen.*
1925 Sachs, Henry N., *Lt. Col.*
1927 Auchincloss, Samuel S., Jr., *Col.*
*Petrie, Malcolm O., *Capt. (posthumously)*
1929 Miller, Harry W., *Lt. Col.*
1931 Goodhand, O. Glenn, *Maj.*
1933 *Carle, E. Richards, *Capt.*
1937 *Laus, Andre N., *Capt.*
1938 Dent, Frederick R., Jr., *Col.*

- 1939 Leghorn, Richard S., *Lt. Col.*
MacMillan, Latimer W., Jr., *Capt.*
Pope, Gordon A., *Maj.*
1940 Goldblith, Samuel A., *Capt.*
Zeamer, Jay, Jr., *Lt. Col.*
1941 Fletcher, Arthur A., Jr., *Lt. Col.*
Shepard, William M., *Capt.*
(posthumously)
1942 Crowley, Thomas T., *Lt. Col.*
Goldis, Alfred, *Capt.*
*Kelley, Charles F., Jr., *Capt.*
Larkin, James J., *Capt.*
Wengenroth, Reece H., *Capt.*
1943 del Valle, Angel A., 1st *Lt.*
Freeman, Roger M., Jr., 1st *Lt.*
Lawson, James T., 1st *Lt.*
10-44 English, Wallace A., *Pvt.*
Van Greenby, Donald M., *Sgt.*
2-46 *Conlin, Joseph A., *Pfc. (posthumously)*

U.S.N.

- 1920 Hayler, Robert W., *Rear Adm.*
1929 *Kiefer, Dixie, *Commo.*
1940 Nelson, Robert S., *Lt.*
Pieczentkowski, Herman A., *Capt.*
1941 Sieglaff, William B., *Comdr.*
1942 Bennett, Carter L., *Comdr.*
1943 Azarigian, Gregory J., *Lt. (j.g.)*

LEGION OF MERIT

U.S.A.

- 1902 McCarthy, Charles, *Col.*
1904 *Bakewell, Joseph H., C.W.O.
1906 Hobson, George F., *Col.*
1907 *Godfrey, Stuart C., *Brig. Gen.*
Mather, John, *Col.*
1910 Bell, Frank F., *Col.*
1911 Richmond, Carl G., *Col.*
1914 Waits, Alden H., *Maj. Gen.*
Wood, John E., *Brig. Gen.*
1915 Lacy, Clive W., *Col.*
1917 Hegenberger, Albert F., *Maj. Gen.*
1918 Chamberlain, Samuel V., *Maj.*
Wheeler, Herbert B., *Col.*
1920 Bradshaw, Aaron, Jr., *Brig. Gen.*
Whitten, Lyman P., *Brig. Gen.*
1921 Barrows, Ralph G., *Col.*
Humphrey, Watts S., *Col.*
Loper, Herbert B., *Brig. Gen.*
Magee, Francis J., *Col.*
Quinton, Alfred B., Jr., *Brig. Gen.*
Smyser, Harold E., *Col.*
Worsham, Ludson D., *Brig. Gen.*
1922 Dunkelberg, Wilbur E., *Col.*
Freedman, Leo H., *Maj.*
Merriam, Kenneth G., *Lt. Col.*
Nesmith, James, 2nd, *Col.*
Robb, Russell, *Col.*
Silverman, Abraham G., *Col.*
Kittrell, Clark, *Col.*
Lewis, Bernard, *Lt. Col.*
Owenshine, Richard P., *Col.*
Randall, Russell E., *Brig. Gen.*
1924 Massari, Silvio C., *Maj.*
Maynard, Perry C., *Col.*
Reinhardt, George C., *Col.*
1925 Sachs, Henry N., *Lt. Col.*
1926 Gleason, Isaac W., *Lt. Col.*
Mattson, Robert E., *Col.*
1927 Berkeley, William P., *Lt. Col.*
Gerhardt, William R., *Col.*
Harrison, Edwin H., *Col.*
Muehnic, George, *Lt. Col.*
1928 Newhall, Charles W., Jr., *Col.*
1929 Miller, Harry W., *Lt. Col.*
1930 Bisson, Reginald A., *Lt. Col.*
Cox, Gilbert L., *Lt. Col.*
Dixon, Marvin H., *Col.*
Hertzka, Wayne S., *Lt. Col.*
Kenyon, John H., *Lt. Col.*
1931 Crotty, Francis C., *Lt. Col.*
McBrien, Joseph, *Maj.*
Mesick, Benjamin S., *Col.*
Westphalinger, Henry R., *Col.*
1932 Harper, James E., Jr., *Col.*
Osborne, Ralph M., *Col.*
Person, John L., *Col.*
Renshaw, Clarence, Jr., *Col.*
1933 Billingsley, John D., *Col.*
Madsen, Ingvald E., *Lt. Col.*
Newton, Carroll T., *Col.*
1934 Fidler, Harold A., *Maj.*
Quinn, Horace A., *Col.*

- 1935 Bemis, Hal L., *Lt. Col.*
Besson, Frank S., Jr., *Brig. Gen.*
Burton, John R., Jr., *Col.*
Lincoln, Rush B., Jr., *Col.*
Powers, William F., *Lt. Col.*
1936 Blaisdell, Kenneth L., *Maj.*
Call, William A., *Col.*
Cohen, Leonard P., *Maj.*
Creasy, William M., Jr., *Col.*
Skidmore, Wilbur M., *Col.*
1937 Chatfield, Miles B., *Lt. Col.*
Matthews, Norman A., *Lt. Col.*
Pickard, Oliver J., *Col.*
Weyher, Theodore A., *Col.*
Wood, Floyd B., *Col.*
1938 Gagwin, Leland G., *Lt. Col.*
Dent, Frederick R., Jr., *Col.*
*Mills, Charles R., *Capt.*
Oldfield, Homer R., Jr., *Maj.*
Welling, Alvin C., *Col.*
1939 Honnell, Pierre M., *Col.*
1940 Dickson, John R. V., *Col.*
Hollomon, John H., *Capt.*
Seedlock, Robert F., *Col.*
1941 Avery, Henry, *Maj.*

U.S.N.

- 1898 Swasey, A. Loring, *Commo.*
1905 Furer, Julius A., *Rear Adm.*
1911 de Florez, Luis, *Rear Adm.*
1916 Patten, David L., *Comdr.*
1917 Crisp, Frederick G., *Rear Adm.*
1920 Ellsberg, Edward, *Capt.*
Pennoyer, Frederick W., Jr., *Rear Adm.*
1921 Brady, Edmund E., *Capt.*
Johnston, S. Paul, *Capt.*
Oster, Henry R., *Commo.*
Wallin, Homer N., *Capt.*
1922 Kitts, Willard A., 3d, *Adm.*
1923 Clarke, William P. O., *Capt.*
Crowley, Roy T., *Capt.*
*Mullinnix, Henry M., *Rear Adm.*
1926 Roberts, Ralph H., *Capt.*
1927 Wellings, Augustus J., *Commo.*
1928 Maguire, Charles J., *Capt.*
1929 Cleton, Edward W., *Capt.*
1931 Humphreys, George C., *Comdr.*
1932 Combs, Thomas S., *Rear Adm.*
Conrad, Robert D., *Capt.*
1933 Ragsdale, Edmund M., *Capt.*
Spiller, John H., *Capt.*
1934 Soule, Rufus A., *Lt. Comdr.*
1936 Sylvester, John, *Capt.*
1939 Howard, John H., *Lt. Col.*
Knoll, Denys W., *Capt.*
1942 Bennett, Carter L., *Comdr.*

PHILIPPINE ARMY

- 1941 Melchor, Alejandro, *Col.*

PURPLE HEART

U.S.A.

- 1911 Kenney, George C., *Gen.*
1922 Acker, Lewis F., *Col.*
Bainbridge, William W., *Capt.*
1923 Slaughter, Willis R., *Col.*
1924 Gegan, John B., *Lt. Col.*
1933 *Carle, E. Richards, *Capt.*
Matson, Lloyd H., *Sgt.*
1934 Becker, Robert C., 1st *Lt.*
*Emery, Robert M., *Lt. (posthumously)*
1935 *Bodell, Brandon B., *Lt. (posthumously)*
1937 Kieley, Thomas J., *Capt.*
1938 Flanagan, Robert, *Capt.*
*Paige, Walter H., Jr., *Pfc. (posthumously)*
1939 Morrill, Manning C., *Capt.*
Pope, Gordon A., *Maj.*
1940 Schneller, George O., *T. Sgt.*
Schuerch, Conrad, Jr., *Lt.*
Skeiber, Stanley C., *Capt.*
Weinbrenner, George R., *Lt. Col.*
1941 Blake, Robert W., Jr., *Maj.*
*Doughten, William S., Jr., *Lt. (posthumously)*
Fletcher, Arthur A., Jr., *Lt. Col.*
Murphy, Francis G., *Capt.*
1942 Crowley, Thomas T., *Lt. Col.*
Jones, Jack J., *Maj.*
Kellogg, William W., *Capt.*
*Kunz, Robert C., *Maj. (posthumously)*
Wengenroth, Reece H., *Capt.*
1943 Hartvig, Douglas M., *Lt.*
Robinson, Gwynn H., *Capt.*

* Died or Killed in Service

ALUMNI AND OFFICERS IN THE NEWS

Honor

¶ For LUCAS E. SCHOONMAKER '17, an Army colonel, who has been awarded the Knight Command Order of Orange-Nassau, the highest award of the Netherlands government, for outstanding service when he was commanding officer of United States forces in Surinam, Dutch Guiana.

¶ For PERCY BUGBEE '20, as president of the National Fire Prevention Association of Boston, which was awarded a special Certificate of Merit at the 27th annual convention of the American Trade Association Executives at Cleveland, Ohio, on October 11 and is this year celebrating its 50th anniversary.

¶ For RALPH W. CHRISTIE '23, an admiral in the Navy, invited as guest speaker to the Navy Day banquet on October 25 at the Davenport Hotel in Spokane, Wash.

¶ For JULIUS A. STRATTON '23, who, in recognition of his wartime services, has been awarded a Medal of Merit by the Secretary of War, Robert P. Patterson, for contributing "greatly to the success of radar aids to bombing, airborne radar flier control and communications."

¶ For JOHN G. TRUMP '33, on whom the King of England has graciously bestowed His Majesty's Medal for service in the cause of freedom, specifically for assistance to the United States Air Forces and co-operation with Britain in the field of radar.

Books

¶ By HOWARD W. GREEN '16, *Cleveland Market Data Handbook*, Real Property Inventory of Metropolitan Cleveland, 1946.

¶ By EDWARD ELLSBERG '20, Captain, U.S.N.R., *Under the Red Sea Sun*, Dodd, Mead and Company, 1946.

¶ By CURTISS T. GARDNER '21, *Bones Don't Lie*, Mill Company, 1946.

¶ By F. S. LINCOLN '22, *Charleston*, Photographic Studies, Corinthian Publications, 1946.

¶ By EDWARD M. J. PEASE '31 and George P. Wadsworth, staff, *Engineering Trigonometry*, International Textbook Company, 1946.

Office and Promotion

¶ For GEORGE H. MEAD '00, as one of three members of the Price Decontrol Board of the Office of Price Administration.

¶ For JAMES MCGOWAN, JR., '08, as president of the Campbell Soup Company, succeeding ARTHUR C. DORRANCE '14, deceased on September 21.

¶ For GEORGE H. TABER, JR., '13, elected vice-president of the American Standards Association at the 28th annual meeting at the Waldorf-Astoria, New York, on November 21-22.

¶ For JASPER B. CARR '16, named president of the newly formed Carr-Consolidated Biscuit Company.

¶ For HOWARD P. CLAUSSEN '16, elected vice-president of the Cotton-Textile Institute, Inc.

¶ For CORNELIUS C. COAKLEY '17, appointed plant manager of the National Aniline Division of the Allied Chemical and Dye Corporation.

¶ For FRANK R. CREEDON '18, appointed deputy administrator to supervise field activities and construction for the Civilian Production Administration, thus becoming responsible for expansion of building materials production, for channeling of materials to veterans' housing and for authorization of nonhousing construction over the entire country.

¶ For WILLIAM C. FOSTER '18, who has been named undersecretary of commerce.

¶ For EDWIN M. McNALLY '18, elected president of the Barbasol Company, succeeding the late FRANK B. SHIELDS '07.

¶ For EDWARD L. COCHRANE '20, Vice-admiral, U.S.N., elected president of the Society of Naval Architects and Marine Engineers for a term beginning this January. WILBUR N. LANDERS '30, Captain, U.S.N., has been made secretary, and WILLIAM S. NEWELL '99, an honorary life member, of the same society.

¶ For LAUREN B. HITCHCOCK '20, elected vice-president in charge of the chemical department of the Quaker Oats Company.

¶ For CREIGHTON B. STANWOOD '20, elected vice-president and manager of manufacture of the Great Northern Paper Company.

¶ For JAMES H. DOOLITTLE '24, head of the Air Force Association, the new national organization for veterans of the Air Forces.

¶ For RALPH F. GOW '25, one of 42 leading industrialists chosen to serve on the council of the Army Ordnance Association, which helps direct the preparation of American science and industry for national defense.

¶ For ROBERT WISE '27, made a director of the International Associa-

tion of Ice Cream Manufacturers.

¶ For WARREN W. WALKER '29, elected president of the Montclair, N. J., Society of Engineers.

¶ For DONALD G. FINK '33, chosen editor of *Electronics* in November.

¶ For EDGAR J. STAFF '35, named executive director of laboratories at the Cushing Veterans Administration Hospital in Framingham, Mass.

¶ For C. OLSON PIKE '37, appointed technical director of the Bishop Gutta-Percha Company in New York and the Peters Manufacturing Company in Wollaston, Mass.

¶ For SCOTT C. LYON '38, assigned to Mexico City as third secretary and vice-consul.

¶ For L. EARLE WELCH '40, elected president of Amerco Products, Inc.

¶ For ERNST A. HAUSER, staff, elected a member of the executive committee of the colloid division of the American Chemical Society.

Articles

¶ By KARL T. COMPTON, President, "A Challenge and an Opportunity," in the fall *Educational Focus*.

¶ By THOMAS C. DESMOND '09, "Let Science In," in the *Survey Midmonthly* for October, and "America Can Prevent Goiter," in the *Ladies' Home Journal* for November.

¶ By MURRAY P. HORWOOD '16, "A Demonstration in Food and Utensil Sanitation at M.I.T.," in the *Sanitarian*, official publication of the National Association of Sanitarians, for July-August.

¶ By H. E. LOBDELL '17, "The Beginnings of Scheduled Trans-Pacific Mail," in a collection of papers given at the Twelfth American Philatelic Congress held November 15-17 in the Hotel Statler in Boston. In the same collection, by STERLING S. DOW '91, "Postmaster Samuel Freeman and His Account Book;" by RUDOLPH B. WEILER '08, "Canal Zone—First Issue;" and by DARD HUNTER, staff, "Some Notes on Papermaking."

¶ By CARLTON E. TUCKER '18, "The Operation of the New England Section, A.S.E.E.," in the *Journal of Engineering Education* for November.

¶ By JAMES R. KILLIAN, JR., '26, "Diverting Attention to the Classroom," in the *Journal of Engineering Education* for November.

¶ By CYRIL S. SMITH '26, "Metals in Modern Society," in *Mining and Metallurgy* for November.

¶ By F. ROLF MORRAL '32, "Demineral-

alized Water in the Wire Mill," in *Wire and Wire Products* for October.

¶ By JAMES E. CASALE '35, "St. Joe's Balmat Mill—Problem in Four Dimensions," in the *Engineering and Mining Journal* for November.

¶ By EDWARD A. HAMACHER '41, "A Cyclotron Beam Current Integrator and Recorder," in the *Review of Scientific Instruments* for October.

¶ By GORDON P. BROWN '42, ALBERT DiNardo, GEORGE K. CHENG '45, and THOMAS K. SHERWOOD '24, "The Flow of Gases in Pipes at Low Pressures," in the *Journal of Applied Physics* for October.

¶ By ALBERT S. EISENTEIN, staff, "An X-Ray Method for Measuring the Thickness of Thin Crystalline Films," in the *Journal of Applied Physics* for November.

Speech

¶ By GEORGE R. WADLEIGH '97, who presided as chairman and introduced CLAUDE E. PATCH '02, speaker, when he addressed the Technical Association of the Pulp and Paper Industry in Milwaukee on October 4, dealing with waste prevention in industry under the title, "Watch Your Waist Line."

¶ By STUART CHASE '10, on "Inflation or Deflation," at the meeting of the Bridgeport, Conn., section of the annual State Teachers' convention on October 25.

¶ By HORATIO W. LAMSON '15, on "Industrial Measurements," before the Lynn section of the American Institute of Electrical Engineers on December 10.

¶ By FORREST P. SHERMAN '17, Vice-admiral, U.S.N., making a strong plea for the maintenance of a powerful Navy, and by WILLIAM A. SULLIVAN '17, Commodore, U.S.N., discussing his war experiences in harbor salvage, both at Navy Day banquets held at the Hotel Somerset in Boston and Liberty Hall in Lowell, respectively, on October 28.

¶ By F. ALEXANDER MAGOUN '18, on "Modernizing Management," before the National Metal Trades Association at its 47th annual convention held at the Hotel Commodore in New York City on November 14-15.

¶ By ROBERT H. ABORN '20, on the "Metallurgy of Ferrous Welding," before the Milwaukee chapter of the American Society for Metals at the City Club on November 12.

¶ By JOEL D. HARVEY '22, on "The Accountant's Part in Developing Long Range Policy and Plans," before a meeting of the New Hampshire chapter of the National Association of Cost Accountants at the Hotel Carpenter in Manchester on November 19.

¶ By ROBERT P. RUSSELL '22, from station WJZ on the November 2d "Voice

of Business" program from Washington.

¶ By WALTER M. SAUNDERS, JR., '22, two lectures in a series sponsored by the Rhode Island chapter of the American Society for Metals: on October 29, "Variations of Hardening," and on November 12, "Annealing, Tempering, Normalizing, Austempering." In the same series on November 26, ALLEN G. SHEPHERD, JR., '30 discussed "Case-hardening, Variations in Grain Size."

¶ By HERMAN C. JONES '28, on "The Appreciation and Manufacture of Pottery," before the Southern Tier Technical Society meeting on October 21 in Johnson City, N. Y.

¶ By HERMON H. SCOTT '30, on "The Reduction of Background Noise in the Reproduction of Music from Records," before a joint meeting of the Boston section of the Institute of Radio Engineers and the instruments and measurements technical group of the American Institute of Electrical Engineers, held at Technology on December 19 under the chairmanship of CHESTER L. DAWES '09.

¶ By WILLIAM M. MURRAY '33, ARTHUR C. RUGE '33, and GREER ELLIS '38, on visual stress analysis, before the New England district of the American Society for Testing Materials at Technology on November 21.

¶ By GURDON M. BUTLER, JR., '38, on "Getting the Most Out of High Carbon, High Chromium Die Steels," before the Springfield, Mass., chapter of the American Society for Metals on November 25.

¶ By JAMES R. JACK, staff emeritus, on the development of steam navigation on the Clyde River, Scotland, before the New England chapter of the Steamship Historical Society of America on November 29.

DEATHS

* Mentioned in class notes.

¶ CHRISTOPHER J. CARVEN '84, October 9.

¶ ELWOOD J. WILSON '86, August 30.

¶ J. PARKER B. FISKE '89, November 15.*

¶ HENRY M. HOBART '89, October 11.*

¶ WILLIAM B. WILLIM '89, date unknown.

¶ ROWLAND H. BARNES '91, October 4.*

¶ WILLIAM C. DART '91, November 17.*

¶ CHARLES A. BRIGHAM '92, July 3.

¶ CHARLES F. WALLACE '92, September 11.

¶ CHARLES G. WAITT '93, November 3.*

¶ HARRY A. BALDWIN '94, October 8.

¶ HENRY D. JACKSON '95, October 12.*

¶ ALFRED F. SHURROCKS '95, August 6, 1945.

¶ LEWIS T. CANNON '96, October 10.*

¶ DAVID T. WHITON '97, October 29.

¶ EARLE C. EMERY '98, October 31.

¶ WINTHROP R. DODGE '99, November 23, 1945.

¶ STANLEY MOTCH '99, August 20.

¶ JAMES T. HARAHAN '00, June 18.

¶ FREDERICK D. INGALLS '00, November 17.

¶ FRANK D. RASH '01, April 18.*

¶ ORLANDO S. STOCKMAN '01, December 6.

¶ EDWARD S. BAKER '02, October 9.*

¶ WALTER S. FITCH '02, November 7.*

¶ WILLIAM H. MATTHIES '02, October 20.

¶ MARY C. MELLYN '02, October 19.

¶ HENRY S. B. STIMSON '02, October 15.*

¶ WALTER M. DRURY '03, July 17.*

¶ GERALD F. LOUGHLIN '03, October 22.

¶ HARRY B. PULSIFER '03, September 2.*

¶ HARRY V. DOHERTY '04, October 4.

¶ HENRY H. W. KEITH '05, December 6.

¶ WEBSTER H. TAYLOR '05, date unknown.

¶ HARRY J. ARMSTRONG '06, in 1945.

¶ DAVID D. EAMES '06, October 25.

¶ PERLEY K. GRIFFIN '06, November 8.

¶ RUSSELL P. RAYNOLDS '06, August 30.

¶ JAMES S. ROGERS '07, October 15.

¶ FRANK B. SHIELDS '07, October 15.*

¶ RICHARD G. WOODBRIDGE, JR., '07, November 7.*

¶ PHILIP J. HALE '08, November 27.

¶ LEO D. NIX '08, October 15.*

¶ CONOR W. B. COPPINGER '11, April, 1945.

¶ ISAAC HAUSMAN '11, October 26.

¶ HUBERT S. SMITH '11, October 5.*

¶ JOHN H. WHITE '12, July 30.*

¶ OLIVER R. HAYES '13, October 28, 1945.

¶ PAUL S. HOWES '14, October 16.*

¶ HAROLD W. NIGHTINGALE '14, October 20.

¶ WILLIAM H. PRICE, JR., '14, November 21.

¶ ELWIN P. NORBERG '15, September 6.

¶ ROBERT V. DERRAH '18, October 8.

¶ ALFRED N. PRAY '18, May 23.

¶ HERBERT R. DORR '20, August 10.

¶ LORING C. CREAMER '21, May 10.

¶ GLEASON W. KENRICK '22, October 29.

¶ JOHN B. FRANKS '25, November 13.

¶ LELAND R. VAN WERT '25, March 26, 1945.

¶ WARREN D. SMITH '27, December 1.

¶ JOHN R. HENDERSON '34, October 25.

¶ KARL J. STIEFEL '35, October 28.

¶ ARTHUR E. FRANKEL '40, May 16.

¶ JOHN R. FRYE '45, July 20.

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

National Metal Congress

The 28th National Metal Congress was held in Atlantic City, N.J., during the week of November 18-22, having for the first time in five years an eastern locale. Four technical societies planned concurrent meetings — the American Society for Metals (sponsor of the congress and exposition), the American Welding Society, the Iron and Steel and Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers, and the American Industrial Radium and X-Ray Society. Technical sessions and lecture courses were scheduled for morning, afternoon, and evening throughout, the 229 papers and lectures, a 50-per-cent increase over any previous metal congress, reflecting the widespread desire for technical knowledge. Manufacturers in the metals field displayed their products, processes, materials, and equipment at the exposition in the Municipal Auditorium.

A.S.M. headquarters were at the Traymore Hotel; A.I.M.E., at the Claridge; A.W.S., at the Ambassador; and those of the Radium and X-Ray Society at the Seaside. Technology was among the dozen or so of colleges to have its annual luncheon at the Traymore on Thursday noon. And among other awards and honorary memberships conferred at the annual banquet of the A.S.M. on Thursday evening was the presentation of their Medal for the Advancement of Research for 1946 to Rufus E. Zimmerman '11, as briefly reported in the November and December issues of *The Review*. Qualifications for this award stipulate that "the candidate shall be an executive in an industrial organization the principal activity of which is the production or the fabrication of metals. He shall be one who, over a period of years has consistently sponsored metallurgical research or development and by his foresight and his influence in making available financial support has helped substantially to advance the arts and sciences relating to metals." The citation which accompanied the award of the medal to Dr. Zimmerman read in part as follows: "From research associate in the former American Sheet and Tin Plate Laboratory, he rose through successive responsibilities to the position of vice-president, United States Steel Corporation, in 1933. Here he found the fullest scope for his talents in leadership, since, as staff officer, he acts to co-ordinate the research of a wide variety of the corporation's enterprises in addition to iron and steel technology. In this domain is, particularly, the corporation's research laboratory at Kearny, N.J., the work of which has become famous throughout the world."

Among the papers presented on the program of the American Society for Metals in which Technology Alumni had a part were the following titles: "Relation of Quench-

ing Rate and Hardenability to the Mechanical Properties of Several Heat Treated Cast Alloy Steels," by Charles R. Wilks, Howard S. Avery, and Earnshaw Cook '22; "Calculation of Press Forging Pressures and Application to Magnesium Forgings," by R. L. Dietrich and Gerhard Ansel '34; "Copper-Manganese Alloys — the Properties of Cold Worked and Annealed Alloys Containing 2 to 20% Manganese," by R. S. Dean, James R. Long '35, T. R. Graham, and D. P. Sugden; "A Metallographic Etchant to Reveal Temper Brittleness in Steel," by Jacob B. Cohen '37, A. Hurlich, and M. Jacobson; "Cast Heat Resistant Alloys of the 16% Chromium, 35% Nickel Type," by Howard S. Avery and Norman A. Matthews '37; "Determination of Knoop Hardness Numbers Independent of Load," by Leo P. Tarasov '37 and N. W. Thibault; "Changes in Size and Toughness of High-Carbon High-Chromium Steels Due to Subzero Treatments," by L. E. Gippert and Gurdon M. Butler, Jr., '38; "Ingot Factors in the Production of Seamless Gun Tubes," by J. W. Spretnak, Karl L. Feters '40, and E. L. Layland; "The Effects of Microstructure on the Mechanical Properties of Steel," by John H. Hollomon '40, Leonard D. Jaffe '39, D. E. McCarthy, and M. R. Norton; "Bainitic Hardening of High Speed Steel," by Clayton K. Baer '41 and Peter Payson; "Transformations in Krupp-Type Carburezing Steels," by A. R. Troiana and John E. DeMoss '42; "The Development of a Turbosupercharger Bucket Alloy," by Edward Epreman '43; "The Stress Rupture and Creep Properties of Heat Resistant Gas Turbine Alloys," and "Structural Variations in Gas Turbine Alloys Revealed by the Stress-Rupture Test," both by Nicholas J. Grant '44; and "The Chromium-Oxygen Equilibrium in Liquid Iron," by Hsin-Min Chen '45 and John Chipman, staff.

Papers given under the auspices of the American Welding Society included the following contributions by our Alumni: "The X-Ray Diffraction Study of the Effect of Residual Compression on the Fatigue of Notched Specimens," by John T. Norton '18, Daniel Rosenthal, staff, and Samuel B. Maloof '43; "Resistance Welding of Spring Steel to Low-Carbon Steel," by Arthur Willink '27; "Welding Problems in Jet Propulsion — Stainless Steel," by Franklin J. Lammers '29; "H-Section Welded Trusses," by Alfred T. Waidelich '30; "Influence of Geometrical Restraint and Temperature on the Toughness and Mode of Rupture of Structural Steel," by Arthur R. Anderson '35 and Alvin G. Waggoner '42; "The Flash Welding of Hard Drawn High-Carbon Steel Wire," by R. W. Bennett and Robert D. Williams '37; "Pressure Gas Welding of Alloy Steel Tubing," by Z. L. Zambrow and Robert D. Williams '37; "Powder Cutting and Scarfing of Oxidation Resistant Materials," by David H. Fleming, Jr., '40; "Final Report of the Board to Investigate the Design and Methods of Construction of Welded Steel Merchant Vessels," a discussion, by Richard D.

Schmidtman '41, J. Lyell Wilson, and Finn Jonassen; "An Investigation of the Phenomenon of Cleavage-Type Fractures in Low-Alloy Structural Ship Steels," by Harold J. Gershenow '43 and G. G. Luther; "Computation of Cooling Time in Butt Welds," by Daniel Rosenthal, staff.

Papers on the program of the American Institute of Mining and Metallurgical Engineers written or collaborated in by Alumni included the following: "A Thermodynamic Theory of the Fracture of Metals," by Edward A. Saibel '24; "Problems in Unstable Flow Under Biaxial Stresses," by W. T. Lankford and Edward A. Saibel '24; "Effect of Alloys in Steel on Resistance to Tempering," by Walter Crafts '26 and J. L. Lamont; "Production of Low-Sulphur Sponge Iron," by Russell C. Buehl '33, E. P. Shoub, and J. P. Riott; "Some Effects of Zirconium on the Extrusion Properties of Magnesium-Base Alloys Containing Zinc," by J. P. Doan and Gerhard Ansel '34; "The Alpha Solid Solution Area of the Copper-Manganese-Aluminum System," by R. S. Dean, James R. Long '35, T. R. Graham, A. H. Roberson, and C. E. Armantrout; "Spot Welding of Titanium," by R. S. Dean, James R. Long '35, E. T. Hayes, and D. C. Root; "Mechanical Equation of State," by John H. Hollomon '40; and "A Statistical Theory of Fracture," by J. C. Fisher and John H. Hollomon '40.

In the A.S.M. series of educational lectures was one on November 19 by Arthur F. Underwood '26 on the "Selection of Bearing Materials." At the A.W.S. meetings a number of Technology men served as chairmen, namely: Augustus B. Kinzel '21, for the session on pressure welding; John H. Zimmerman '23, for that on cutting; George V. Slottman '25, for a miscellaneous session; George S. Mikhlapov '26, for that on aircraft; Harry W. Pierce '26, for that on shipbuilding; Gerard E. Claussen '31, for the university research committee; and Meredith W. Brewster '26, as vice-chairman of the session on hard facing.

Southeastern M.I.T. Association

On November 14, the Association met to honor James R. Killian, Jr., '26, as their guest at dinner at the Mountain Brook Country Club in Birmingham. The evening was a bit cool for these southern regions at this time of year, calling for a preliminary assembly in the grill room, where the dinner committee, composed of Merrill E. Pratt '16, chairman, F. C. Weiss '13, and William Hassinger '27, who had anticipated just such a temperature drop outdoors and seen to it that a log fire was under way at one end of the room while at the other end the guests were experiencing a choice contribution from the mountains of Kentucky.

Dr. Killian spoke of the numerous and complex postwar problems at the Institute and their progressive solution — problems academic and financial, problems concerning admission, curriculum, and housing.

His exposition of a complicated situation was so lucid and concise that each of his listeners felt the gratification of having received an intimate, firsthand report.

Oscar G. Thurlow '04 was selected by the Club as its candidate for membership on the national nominating committee from district eight. The chairman was asked to appoint a committee who would select club officers for the coming year. Members present for the occasion were as follows: Julian E. Adler '13, George B. Bradshaw '03, Harold F. Cotter '23, Douglas K. Crawford '42, James R. Cudworth '21, Douglas F. Elliott '24, George J. Fertig '24, Charles B. Gamble, Jr., '34, William H. Hassinger '27, Prescott V. Kelly '13, Laurence D. Luey '29, Thatcher H. Mawson '27, Kenneth McDonald '24, Howard S. Nelson '25, Alden W. Peterson '26, John W. Powers '33, Merrill E. Pratt '16, Theodore Randolph '45, Joseph G. Reid '08, Amasa G. Smith '29, Robert C. Stobert '12, Oscar G. Thurlow '04, David Thurlow '41, and Fernand C. Weiss '13. — GEORGE J. FERTIG '24, *Secretary*, Comer Building, Birmingham 3, Ala.

M.I.T. Club of the Kanawha Valley

The third official meeting of this recent addition to the alumni club roster was held on November 18 at the Daniel Boone Hotel in Charleston, W. Va. The featured guest of the evening was James R. Killian, Jr., '26, Vice-president of the Institute, who graciously included the Kanawha Valley and our new club as the last stop in his flying continental tour.

After a roast-beef dinner, the President, Holden M. Dougherty '22, called the meeting to order. Election of new officers was the first item on the agenda, and the following were chosen to pilot the Club for the coming season: as president, Francis George Davidson '22 and as vice-president, Melville E. Hitchcock '37. The climax of the meeting was, of course, Dr. Killian's address, "The M.I.T. of Today and Tomorrow." The learned administrator touched upon many topics dear to the hearts of Tech men, no small part of which were his studied comments on the current shortage of young scientists and engineers.

Michael J. Lach '36 assisted Mr. Dougherty in planning for the meeting. Among those who met Dr. Killian at the train on his arrival were William S. Brackett '23, local Honorary Secretary, and Irvin L. Murray '26 of Dr. Killian's class at the Institute. In attendance at the dinner were the following: Arthur M. Rosenblatt '09, Charles F. Hobson '11, Thomas W. Bart-ram '21, Francis George Davidson '22, Holden M. Dougherty '22, William S. Brackett '23, Irvin L. Murray '26, Lombard Squires '31, Edward F. Hillenbrand, Jr., '33, Waverly Q. Smith '34, Michael J. Lach '36, Benjamin T. Woodruff '36, Arthur W. Barry '37, Melville E. Hitchcock '37, Joseph C. Jeffers, Jr., '40, Northrop Brown '41, Charles A. Wales '41, Eugene W. Hanszen '42, Daniel G. Hulett '42, Ralph L. Kelly, Jr., '42, Robert W. King '42, Richard P. Little '42, Richard T. Merritt, Jr., '42, Arthur J. Power '42, Raymond E. Hahn '43, Howard P. McJunkin '43, Raoul L. Provost '43, and James Ryder '49. — DANIEL G. HULETT '42, *Secretary*, 1595½ Quarrier Street, Charleston 1, W. Va.

M.I.T. Club of Chicago

At a dinner meeting held at the Electric Club on October 31, the guests of honor were James R. Killian, Jr., '26, Executive Vice-president, and Joseph J. Snyder '44 Assistant Treasurer of the Institute. After a most enjoyable dinner, Bill Steinwedell '25, President, announced the request of Charles E. Locke '96, Alumni Secretary, that the name of the Club be changed to the M.I.T. Club of Chicago, this being more easily identified by the general public. The change in name, having the approval of the board of directors, was made effective as of this meeting.

Sherry O'Brien '17, chairman of the Alumni Fund committee, gave a very encouraging report of the progress made in increasing the number and amounts of the individual contributions to the Alumni Fund; he found the success of his previously announced plan of suggested annual contributions of one-half of one per cent of each Alumnus' yearly salary to be most gratifying. Bob Clyne '30, chairman of the placement bureau committee, reported that Alumni requesting positions had been readily placed and spoke of the high caliber of the men interviewed for the desired jobs.

The first guest speaker, Joseph J. Snyder, gave interesting figures and facts pertaining to his work as assistant treasurer at the Institute. President Steinwedell then introduced Dr. Killian, who spoke on "The M.I.T. of Today and Tomorrow." This was the highlight of the evening, and his talk was enjoyed by the 86 men in attendance. He pictured the busy Institute as it is today with all available space occupied by the classes and with living quarters at a premium. His eloquent and able presentation of all phases of Institute activity and of numerous interesting plans for the future made many envious of the present students and those to follow at the Institute.

The next dinner meeting is being planned for the latter part of January or the first of February, and the usual notices of time and place will be mailed. — SIDNEY P. GRIFFIN '20, *Secretary*, Public Service Company of Northern Illinois, 72 West Adams Street, Chicago 3, Ill.

Rocky Mountain Technology Club

The first 1946-1947 meeting was called on October 23 as a dinner meeting at the University Club, Denver, to receive Professor B. A. Thresher '20, Director of Admissions at the Institute, on his recent western trip. Professor Thresher's discussion of Institute affairs was so interesting that little time remained for other business; however, the attendance of 25 Alumni indicated considerable interest in reviving activities from their somewhat dormant condition during the past few war years.

The new officers elected for the coming year are: Arthur L. Hill '23, President; Robert S. Nelson '40, Secretary-Treasurer; and Bernard S. Coleman '19, Vice-president (since moved farther west to Los Angeles). Our file lists about 90 Alumni here in Denver with 30 more in near-by towns. An all-encompassing questionnaire is being sent out before another meeting to obtain for our files more personal and business information about our Alumni in this area and to feel out the true interest in a future pro-

gram. We should like to hear from other clubs which would seem to have found the answer for an active group. The next meeting will probably be early in December.

The Club expresses gratitude to Dana E. Kepner '21, who has shepherded it through the past year. — ROBERT S. NELSON '40, *Secretary*, 4886 Perry Street, Denver 12, Colo.

Detroit Technology Association

The Association held a dinner meeting at the University Club in Detroit on October 29. Lawrence E. Good, a graduate of Oberlin College and executive director of the Detroit Inter-American Council, who has lived in South America for six years and traveled extensively on educational and industrial work, spoke on the subject, "What's Happening to the Good Neighbor Policy." — THOMAS F. MORROW '35, *Secretary*, 16894 Birwood Avenue, Detroit 21, Mich.

Technology Club of Hartford

The Club had a very enjoyable outing with the New Haven County Technology Club on June 8. Rather than repeat details, we refer the reader to the report of the New Haven Secretary elsewhere in these columns. Twenty attended from the Hartford area.

On October 30, 100 members and guests of our Club joined the New Haven club at Strathcona Hall, Yale University, New Haven, to hear a discussion by President Compton on the subject of the Bikini atomic bomb tests.

President Grew '27 of the New Haven club presided and after a few welcoming remarks introduced the officers of both the Hartford and New Haven clubs. He then turned the meeting over to Hudson Hastings '07, professor of economics at Yale University, who presented the speaker of the evening. After a brief review of recent developments at Technology, Dr. Compton discussed the atomic bomb tests and presented a sound movie in color of the preparations for the tests, the explosions, and the results. He then reviewed the use of atom bombs at Hiroshima and Nagasaki and the part they played in ending the war.

Before the meeting a group of Hartford club members and guests met for dinner at New Haven's famous Hof-Brau Haus. — FRANKLIN S. ATWATER '38, *Secretary*, 109 Elbridge Road, New Britain, Conn.

Indiana Association of the M.I.T.

Elliott G. Peabody '21, our new President, presided at the usual monthly meeting of the Association, which was held at the Apex Grill, 129 East 16th Street, Indianapolis, on November 13.

M. E. Bechtold, field engineer for Allis-Chalmers, showed films on the steam turbine, the condenser, and the gas turbine. The first two were excellent stories on this important source of prime power accounting for 65 per cent of the electric power of the country. The picture on the gas turbine was most worth while. Fundamental and basic principles were made clear. The history of

the device was given and the reasons for its slow development explained. These reasons were lack of a satisfactory compressor and heat resistant metals. The Swiss solved the first problem, and intensive metallurgical research has and is solving the latter. Operating temperatures of 1300-1500 degrees F. are necessary for satisfactory efficiency, and they are now attainable. Mr. Bechtold then told us of the development work being done on the gas turbine locomotive, using powdered coal as fuel.

The following members were present: J. L. Wayne '3d, '96, J. H. Babbitt '17, E. G. Peabody '21, H. C. Karcher '25, S. C. Boyle '27, R. C. Wallace '27, T. G. Harvey '28, Russell Fanning '30, G. W. Klumpp '30, P. E. Smith '36, B. A. Monderer '39, R. M. Poorman '45, J. T. Parker, I. H. Hayes, and M. E. Bechtold were guests. These minutes were written by T. G. Harvey '28. — JOHN H. BABBITT '17, *Secretary*, 3734 Carrollton Avenue, Indianapolis 5, Ind.

M.I.T. Club of Milwaukee

Our first postwar meeting was held on June 27 at the University Club. The Club has been inactive for the past five years. Ralph T. Jope '28, Treasurer of the Alumni Association, Business Manager of The Review, and Secretary of the Alumni Council on Athletics, was guest speaker. He brought us up to date on the Institute's growth over the past six years with the aid of a series of slides showing the buildings and new housing developments. He also told us about the regatta at Seattle, which he had just witnessed. Twenty-four members were present at this meeting.

We were very fortunate in having James Rhine Killian, Jr., '26, Vice-president of the Institute, as guest speaker at a dinner meeting held in his honor on November 1 at the University Club. Dr. Killian told us of the Institute's plans for the future in its educational and research programs and emphasized the fact that undergraduate work will be stressed, along with a greatly expanded graduate program. He also spoke about the shortage of engineers and scientists which will exist for the next five years. The lively discussion that followed was led by Philip N. Cristal '17, placement chairman for Wisconsin. Dr. Killian was accompanied by Joseph J. Snyder '44, Assistant Treasurer of the Institute.

Bruno H. Werra '32, President of the Club, conducted both meetings, and William Hahn '42 acted as secretary in place of Warren A. Bjorn '34, who recently resigned this office after many years of service. A meeting is scheduled for Thursday, December 5, to elect new officers and plan meetings for 1947.

Members present to hear Dr. Killian included the following: M. P. Allen '13, G. Y. Anderson, Jr., '24, J. B. Ballard '35, E. B. Bartlett '06, R. H. Becker '22, M. F. Biancardi '40, W. A. Bjorn '34, R. E. Boeck '28, J. B. Cobb '37, P. N. Cristal '17, J. L. Erickson '42, L. O. French '10, H. F. Goelzer '46, William Hahn '42, F. E. Hamilton '07, L. J. D. Healy '09, J. K. Heller '45, C. E. Hoerig '38, C. R. Holman '36, J. L. Hunn '44, M. D. James '27, A. E. Kilgour '38, William Mark '43, E. S. Mathiesen '29, H. Meier '38, A. J. Mestier '43, G. W.

Pollock '21, E. L. Smith '05, R. R. Weeks '42, B. H. Werra '32, and S. C. Westerfeld '31. — WILLI M. HAHN '42, *Secretary*, 750 North 14th Street, Milwaukee 3, Wis.

New Haven County Technology Club

Twenty Hartford club and 80 of our members and guests enjoyed a joint outing at Pine Orchard, Conn., on Saturday, June 8. Herb Polleys '18 of New Haven, and Franklin Atwater '38 from Hartford co-operated on arrangements. The festivities opened with registration at 2:00 P.M. and included golf, swimming, bridge, and several delightful motor cruiser trips to the Thimble Islands through the courtesy of E. W. Taft '13.

A six to seven cocktail hour preceded delicious steak and lobster dinners. Floyd Buck '29, Acting President of the Club, and then welcomed the Hartford guests, and their President, Norman J. Vile '16, responded with thanks. President Gada '26, visiting from Syracuse, then thanked Mr. Buck for ably conducting activities during 1945-1946. The secretary's annual report was read and approved, as was the treasurer's report. Election tellers G. V. Maconi '15, B. R. Hubbard '25, and C. W. Somers '12 announced as 1946-1947 officers: Lawrence B. Grew '27, President; William W. Young '29, Vice-president; Walter S. Wojtczak '37, Secretary; Judson M. Rogers '40, Treasurer; and Floyd W. Buck '29, Governor at Large. Mr. Grew introduced these officers and appointed Plant '27, Weeks '24, and Hetzel '23 as program committee. The ladies then were told to send the boys to the meetings with voting instructions if they wanted to continue mixed gatherings.

Eben Haskell '26 reported little activity for the New Haven County placement committee. George L. Mylchreest '10 of the Hartford club cited numerous Hartford employee inquiries and offered to refer men to New Haven. Ed Taft '13 was thanked for his marine activities of the afternoon. W. W. Young '29 and Bill Brothwell '33 were commended for their efforts in securing from many sources favors which were pleasant additions to the party. Franklin Atwater '38 gave credit lines for the favors donated. It was voted to send letters of thanks to all who had bestowed them.

George Mylchreest led Hartford cheers for the New Haven club invitation. Charlie Haynes '04, visiting from New York, took a bow. Bill Pinkham '22 awarded prizes for bridge to Mrs. Black, Mrs. Wellington, and Mrs. Manning. Hudson Hastings '07 took the prize for golf with a close mathematical "one up" over Cartwright '12. Mr. Osborn '15 led a closing cheer, and the formal meeting adjourned. Dancing was enjoyed, until midnight closed an excellent outing. — WALTER S. WOJTCZAK '37, *Secretary*, Dwight Building Company, 152 Temple Street, New Haven, Conn.

Technology Club of New York

Your correspondent apologizes for having missed out on the December issue of Lobbie's elegant sheet, but because of the truck strike, the coal strike, the printers' strike, the Trans World Airline pilots' strike, and all the other ridiculous excuses

for not wanting to work, we went on strike also, at least mentally so. Besides, the greater interim helps to generate more news.

There is much cooking here in New York. One of our projects now in the works is the proposed change in name of the Club. So many kinds of technology have appeared in recent years that the word has lost much of its former power of identification. Hence, your board of governors now has under consideration changing our name to the M.I.T. Club of New York City. Plans are in process to make the necessary changes, and you will be informed about them in the not-too-distant future. With these changes we expect to make other announcements of importance to each of us. Should you try to find us in the New York telephone directory and fail, it is suggested that you get in touch with our President, George Dandrow '22, in care of Johns-Manville Company, or with the undersigned, at the address shown in the signature.

Two other problems, somewhat minor to some of us, but very major to Charlie Locke '96, are the addresses of James E. Everett '34 and Joseph Yormark '22. If either of you by chance should scan these columns, will you please apprise the Register of Former Students directly or telephone the Secretary of your present whereabouts? We don't want to collect any money, only locate you, that's all.

It is with sincere regret that we announce the loss of Bertram F. Nagy '44 an Army lieutenant, who was killed in action on June 16, 1945, and Thomas A. Roper '10, who passed away on August 1.

New members admitted during the past months are as follows: Philip A. Warner '92, Clarence S. Roe '13, Nelson H. DeFoe '25, James R. Buckley '27, Carl G. Crocker '29, Norman K. Fournier '28, George Moy '31, John Lowe, 3d, '37, Fritz R. Krum '41, William G. Kussmaul, Jr., '41, Victor K. Wagner '41, and Cortlandt F. Ames '45. Addresses may be had on request. We regret sincerely losing Eric Hodgins '22 and Sanford L. Willis '15, both of whom find circumstances dictating withdrawal from our midst. With the loss of Eric, the great Class of 1922 is at least one member weaker, and the old 1924 comes that much closer to being the heavyweight of this great metropolis. Let us hope that both of these gentlemen may soon find it desirable and convenient to rejoin us.

Visiting fireman included C. H. Shaw '10, A. J. R. Houston '22, Bill Correale '24, and R. D. Earle '28. My G-2 informs me that Dr. Duff was also a visitor, and unless I miss my guess, he is one of our most loyal and spirited members for many a decade, past and to come. Again, may we urge each of the visitors to sign the visitors' register, for otherwise we have no record of their being with us.

We had hoped to have our annual blow-out during the month of December, but circumstances have kept us too busy in other directions. George Dandrow, Bill Mueser '22, Sam Reynolds '22, Joe Littlefield '17, and Win McNeill '17 have been combing their territories for new business and new members for the Club, and the results of their efforts may be noted in almost any of these monthly wheezes of mine. By the time you get this one, the Christmas

season will be behind us, the New Year beginning to put on clothes, and I wish every one of you a prosperous and happy 1947. — WILLIAM W. QUARLES '24, *Secretary*, McGraw-Hill Publishing Company, 330 West 42d Street, New York 18, N. Y.

Technology Club of Philadelphia

The Club's annual meeting will be held again on Tuesday evening, January 21, in the Bellevue-Stratford Hotel's Burgundy Room. In keeping with our policy of bigger and better annual meetings, an all-time record attendance is expected. Alumni on the Club's mailing list will receive reservation cards and details of the meeting when arrangements have been completed; others are urged to write the Secretary in ample time for reservations. This annual function is always a high spot for Tech men in the Philadelphia-Wilmington area. Your friends and business associates will enjoy the top-notch program, too, and they are very welcome.

A feature of the annual meeting is the distribution to members of the Club's new directory. Alumni are listed alphabetically, by classes, and by business connections. That these little booklets are not only interesting but useful, too, is shown by the avid reception given them. Your copy will be handed you as you enter the Burgundy Room and head for the punch bowl. The location of the latter, incidentally, is easily determined; at the exact center of each of the several throngs will be a punch bowl.

One of the few items of business conducted at the annual meeting is the election of officers and members of the executive committee. This year the nominations will be presented by Garland Fulton '17, whose committee includes Claude A. Anderson '05, Hugo H. Hanson '12, Joseph Greenblatt '22, Franklin E. Washburn '26, John Lawrence '32, John K. Jacobs '37, and Samuel K. McCauley '41. Of interest to Alumni in this region is the recent action taken by the executive committee of the Alumni Association. The committee recommended that local clubs consider changing their names, where necessary, to indicate their connection with M.I.T. Thus, in the future, our Club might be called the M.I.T. Club of Philadelphia if the members approve.

We were pleased to note recently that our good friend Ralph M. Shaw, Jr., '21 appeared in print with a contribution to the magazine *Steel*. Mr. Shaw, who is president of Pedrick Tool and Machine Company, wrote an authoritative article on the economic aspects of tube bending.

Our Club continues to grow and boasts 244 members so far this year. The man currently responsible for a large measure of this growth and for making our meetings memorable is our genial President, Herbert W. Anderson '15. Andy has given freely of his time and energy to make the Club a success in all respects, and the Philadelphia Alumni deeply appreciate his efforts. President Anderson's right-hand man is our Vice-president, George T. Logan '29. George presided at the meeting held on October 15 at the Sheraton Hotel when Alden H. Waitt '14, Dudley E. Bell '17 and Mrs. Bell were our guests.

Finally, we suggest that you mark January 21 on your new calendar as the date

you don't want to miss with the Technology Alumni in Philadelphia. For information about Alumni in the Philadelphia area, call Jefferson 5-0642. — ROBERT M. HARBECK '28, *Secretary*, 605 Foss Avenue, Drexel Hill, Pa. *Assistant Secretaries*: SAMUEL K. MCCAULEY '41, 288 Copley Road, Upper Darby, Pa.; FRANK S. CHAPLIN '32, 822 Glendalough Road, Philadelphia 18, Pa.

M.I.T. Club of Western Maine

A meeting was held at the Hotel Eagle, Brunswick, Maine, on November 20. From Westbrook, Augusta, Portland, Bath, and Brunswick, 28 members and wives attended, with Joe Warren '91 of Cumberland Mills representing the oldest class present, Jim Barlow '05 of New Gloucester as the "farm-labor" constituent, and John White '45 of Falmouth the "baby" of the gathering. W. S. Newell '99 sent his regrets, saying that he was scheduled to speak on the Able and Baker tests of Bikini at Bath that evening.

Charlie Locke '96, Alumni Secretary, spoke briefly concerning alumni activities and recommended President Compton's Report as reading for the activities, present and planned, of the Institute. He introduced E. J. Whitcomb '11 who spoke on the topic, "Transportation — Present and Future." A canvass of the members present brought out the fact that they favored a spring meeting in Portland, at which the newly elected Executive Vice-president of the Alumni Association, Harold E. Lobdell '17, would be the invited guest. — STANLEY W. HYDE '17, *Secretary*, North Yarmouth Academy, Yarmouth, Maine.

M.I.T. Alumni Association of Utah

A dinner meeting was held at the Hotel Utah on October 21, to hear Professor B. A. Thresher '20, Director of Admissions, give a most interesting report on the latest developments at the Institute. Professor Thresher showed how as a result of the war, Technology was greatly enlarged as to both membership and size of buildings with an increase in enrollment of from 3,000 to nearly 5,000. The high quality of returning veterans was most inspiring to Professor Thresher, who was interested in seeing what effect such a holocaust might have had on the manner in which our returning service men presented themselves. Needless to say, they were quite superior to the usual candidate for admission. The Institute was a center of war research, especially in the field of radiation; as a result, the total expenditures of all kinds soared from some \$5,000,000 to \$35,000,000 a year. To many of us it was news to learn that certain liberal arts colleges such as Williams co-operate with Technology to the extent of giving a bachelor of arts degree at the end of three years, followed by a bachelor of science at the termination of two additional years at the Institute. This practice will be renewed after a lapse during the war. The meeting adjourned with the departure of Mr. Thresher for Denver. We all enjoyed hearing him and hope he may return again.

The Club re-elected G. M. Gadsby '09, President; M. P. Eggleston '31, Secretary-

Treasurer, and renamed its organization. We have a modest membership of 38 and hope to have the pleasure of hearing other interesting speakers, who may stop off on their way through these wide open spaces. Any traveling Alumnus is cordially invited to join us. Regular meetings are not held, since activity here does not as yet warrant them. The following members were present: W. J. Cope '37, M. P. Eggleston '31, D. A. Elkins '36, G. M. Gadsby '09, L. R. Gardner '45, H. M. Hurst '40, C. I. Justheim '22, J. W. Kendall '21, H. D. Landes, Jr., '42, S. L. Macdonald '39, F. L. Markham '30, D. D. Moffat, Jr., '41, H. G. Poole '41, B. A. Seare '24, E. W. Sloan '20, George Tanner '42, L. M. Thatcher '38, and F. T. Whitworth '21. — MARVIN P. EGLESTON '31, *Secretary*, University Club, 136 East South Temple Street, Salt Lake City 1, Utah.

M.I.T. Club of Central New York

Professor B. E. Proctor '23 of Technology was our guest speaker at the October 23d meeting. He was introduced to the group by a classmate of his, Gerald Fitzgerald '23. To those of us who had not been back to the Institute for many years, Professor Proctor's talk about conditions at the old alma mater was especially interesting and informative.

The following 25 Alumni, ranging from the Class of 1907 to the Class of 1946, were present: H. N. Burhans '07, S. N. McCain '09, H. G. Reynolds '10, E. C. Gere '13, H. P. Gray '16, J. H. Kaiser '19, L. A. Waters '20, E. A. Gruppe '22, G. A. Fitzgerald '23, F. S. Hungerford '24, Natalie Gada '26, R. F. Shea '24, M. W. Jennison '27, J. S. Middleton '29, A. A. Berestneff '30, D. A. Cook '31, E. C. Hughes '31, D. E. MacLeod '38, A. M. Gelbart '40, J. F. Owens, Jr., '40, R. S. Haven '42, F. S. Hodgdon '42, C. O. Wood '42, J. J. Freiberger '45, and D. G. Black, Jr., '46. It was a pleasant surprise to welcome Marshall Jennison '27 into our midst. He recently joined the faculty of Syracuse University, where he is connected with the division of bacteriology in the department of plant sciences. Your Secretary remembers taking a course in air examination under him back in 1938.

We plan to have our next dinner meeting shortly after Christmas, again holding it at the University Club in the city of Syracuse. Interested Alumni, not now in touch with the Club, are invited to write the Secretary for further information. — D. EARLE MACLEOD '38, *Secretary*, 211 Columbia Avenue, Syracuse 7, N.Y.

Technology Club of Central Florida

The Club held its first postwar meeting on November 15, at Rubin's Restaurant in Tampa. A. W. Higgins '01 was elected president, succeeding Harvey M. Mansfield '83, deceased, and W. H. Mills '34 was elected secretary. A considerable part of the time at this first meeting in several years was spent in bringing one another up to date on the various individuals' activities during and since the war, this leading to a general discussion of subjects of interest. There are some 80-odd Alumni in this territory, and the Secretary was instructed to send each of these a complete membership

list of the Club. It was voted to have the next meeting in January.

The following members were present: F. O. Adams '07, J. J. R. Bristow '14, J. W. Clary '96, L. P. Geer '15, C. L. Hall '42, A. W. Higgins '01, M. R. McKinley '19, M. J. Mackler '17, T. B. Mason '25, C. G. Merrell '88, W. H. Mills '34, W. B. Newell '17, A. C. Redman '00, B. L. Skinner '42, and W. W. Upham '23. — WILLIAM H. MILLS '34, *Secretary*, Post-Office Box 1050, St. Petersburg 1, Fla.

M.I.T. Women's Association

On December 6, the Association held its second meeting of the year. Supper was served at six o'clock in the Emma Rogers Room at the Institute. We were especially honored and pleased to have Mrs. Compton with us. The women students also were invited, and a goodly delegation came, bringing the attendance up to something like 55. In fact, there seemed to be more guests than members present to receive them. As usual at this time of year, near her birthday on December 3, special reference was made to Ellen H. Swallow '73, the pioneer woman student at Technology, who proved such a great success as to pave the way for all the coming generations. She became a member of the staff, the wife of the late Professor Robert H. Richards '68, and eminent in the fields of home economics, sanitary chemistry, and public health.

A brief talk by President Sage, touching lightly on current matters before the Association, preceded an able account of Mrs. Richards' life and personality by Miss Gertrude Spitz '17, who knew and worked for her. The annual gift to the women students — this year a very utilitarian Webster's Dictionary and stand — was presented and accepted in their behalf by Mary Frances Penny '47, President of the Association of Women Students.

The boards were then clear for a very great treat — Henry B. Kane '24 and his lecture on "The Wild World," an illustrated talk which has delighted Technology clubs all over the country. Lovers of animals and birds, as well as those interested in expert photography, find his pictures irresistible, and the stories of how he got them even better. Certainly, his unsuspecting subjects made beautiful and expressive portraits — from the quaint little whitefoot mouse, the gorgeous bullfrog, and the vengeful crow (all characters in Mr. Kane's books for children), to the several grouchy and forbidding owls — many of them in color, others in split-second action. One can only wonder at the patience, resourcefulness, and speed which put them on record. — ADELAIDE A. TOOMBS '42, *Secretary*, 47 Alpine Street, Roxbury 19, Mass.

CLASS NOTES

1885

Arthur Dehon Little (1863–1935), in whose honor the Arthur Dehon Little Memorial Lectureship was established, was most widely known as an outstanding pioneer in the application of science to industry. Indeed his important achievements in

this field overshadowed equally significant accomplishments in several other fields.

Dr. Little's more generally recognized technical activities were in the fields of the chrome tanning process (1893), artificial silk (1894), carbon filaments (1895), waterproof papers, wood waste utilization, alcohol production, casein products, electrolytic production of chlorine and soda, hypochlorites, and chlorates. In 1917 his model industrial research laboratory, the home of Arthur D. Little, Inc., was "dedicated to industrial progress," an opportune moment in view of the enormous expansion of American industry caused by the large demands for supplies by England and France and the United States armed forces. In 1905 his long interest in provisions for the education and training of young men in the advanced study of chemical technology led to the inauguration of the Research Laboratory of Applied Chemistry at M.I.T. The Chemical Engineering Practice School at M.I.T. owes its inception to Dr. Little; and his untiring efforts as a Visiting Committee member of the Chemistry and Chemical Engineering Departments made possible the Eastman Research Laboratories for graduate study in chemistry and physics.

He was president of the American Chemical Society for two terms, 1912–1914, president of the American Institute of Chemical Engineers, 1919, and president of the British Society of Chemical Industry, 1928. The University of Manchester conferred upon Dr. Little the degree of doctor of science in 1929, and the Manchester College of Technology made him an honorary associate. In 1931 he received the Perkin Medal, an award which took cognizance of the fact that he was largely responsible for the establishment of chemistry as one of the most important of the factors in material progress.

The Arthur Dehon Little Memorial Lectureship was established in 1944 with funds donated by Arthur D. Little, Inc., in memory of its founder. The dislocation of normal activities at the Institute owing to the war, however, has made it impossible to inaugurate the lectures until this Autumn. The first lecture was held at Technology on November 19, and the lecturer was Sir Edward V. Appleton, K. C. B., F. R. S., who is secretary to the Department of Scientific and Industrial Research in England. Preceding the meeting, President and Mrs. Compton gave a reception and buffet supper at their residence on Memorial Drive, Cambridge. — ARTHUR K. HUNT, *Secretary*, Longwood Towers, Brookline 46, Mass.

1888

Our President, Ned Webster, continues to lead in originating new displays of flowers at the shows of the Massachusetts Horticultural Society. He has named the cascade chrysanthemum illustrated in the Boston *Herald* of November 15, "Jane Hart" for one of his 14 grandchildren.

There must be a flair for publicity in some '88 men; at least Fred Nichols seems to have one, as shown by his circular postal card dated November 11, Orlando, Fla. It reads: "I left Chicago at 10:00 A.M., by Eastern Air Lines, and landed here at 7:35 P.M. on October 23. Fortunately, they had this place picked out for me, and as soon as

I gave my assent they began moving me on October 25. I simply lay on my bed, and friends did all the moving while I looked on. It wasn't any work for me — except when I try to find something now. Most of my stuff is in the large garage, but almost everything for immediate need is within reach, right at my elbow in my small, well-lighted room, under one roof. My washing and mending are also done under this same roof. The food is good, and plentiful, including meat and butter. I eat, sleep, and feel well. I played contract bridge with friends here at home on October 26, 29, and 30, and on November 5."

As your Secretary's new home in Princeton is only two blocks from the Palmer Stadium, where all the football games take place, he can think of no good excuse for not going to the games. The Harvard game was won by Harvard, 13 to 12, which reminds him of the game in 1889 in Cambridge which Harvard did not win and after which athletic relations were broken off by Harvard, which held that Princeton was too rough, Captain Holden of Harvard having had his breastbone broken by a Princeton man hurdling the line. But that was 57 years ago, and the game has improved since then.

We are all octogenarians now, or nearly all, and some, like Eastman, have passed their 86th milestone. Your Secretary celebrated his "octo-birthday" on November 10 by going to Asbury Park and watching the big rollers come in, without going into them as he did at Chebeague Island last August. He still thinks Princeton is a pleasant place in which to spend the fall, winter, and spring. — BERTRAND R. T. COLLINS, *Secretary*, 291 Nassau Street, Princeton, N. J. SANFORD E. THOMPSON, *Assistant Secretary*, The Thompson and Lichtner Company, Inc., Park Square Building, Boston 15, Mass.

1889

Henry M. Hobart died on October 11. His home was at 10 Balltown Road, Schenectady, N.Y. The following is from the New York *Times* on that date: "Henry Metcalf Hobart, a retired consulting engineer of the General Electric Company, died here . . . at Ellis Hospital after an illness of several weeks. His age was 77. An expert on welding, Mr. Hobart developed mercury rectifiers and was an authority on arc welding, design of dynamo-electric machinery, insulation and standardization. A member of the national committee of the International Electro Technical Commission, he worked with the late Dr. Charles P. Steinmetz. On Oct. 19, 1936, Mr. Hobart was presented with the Samuel Wylie Miller memorial medal of the American Welding Society, of which he was a founder and director. He was the editor of the *Dictionary of Electrical Engineering* and the author of many scientific works. Born in Boston, the son of William and Martha Hobart, he was graduated from . . . Technology in 1889 with a B.S. degree in electrical engineering. He became affiliated with the Thomson-Houston Electric Company, which was succeeded by General Electric in 1899 and later joined the British company of the same name. In 1900 he joined the Union Electricitats Gesellschaft of Berlin, where he remained three years before going to London to take up an inde-

pendent consulting practice. He came to the Schenectady General Electric plant in 1911 as consulting engineer, a position he held until his retirement in February, 1941. Mr. Hobart was a former vice president of the American Institute of Electric Engineers and a Fellow of the American Association for the Advancement of Science. He also was a member of several British engineering organizations and had represented the American Welding Society on the engineering division of the National Research Council. He leaves a widow, Mrs. Edith Walpole Hobart."

Bosworth's address is now Villa Marietta, Vaucresson, Seine et Oise, France. L. E. Johnson's address is now Lake Court Apartment, West Palm Beach, Fla. Kin-sley Dunbar's address is 33 Ingraham Road, Wellesley 81, Mass.

The Secretary has received with the compliments of John W. Linzee his monumental genealogical work, *The Linzee Family of Great Britain and U. S. A. and Allied Families of Hood, Hunt, Amory, Brown, Evans, Wooldridge, Penfold and Tilden*. This splendid work comprises two volumes with a total of 910 pages, beautifully printed and handsomely illustrated with many portraits. It was privately printed in 1917.

Parker Fiske's long and active life came to an end on November 15. The Boston Herald of November 17 contained the following obituary: "J. P. B. Fiske, inventor, . . . pioneer in electric refrigeration and inventor of the decorative 'tapestry' brick for building, . . . died . . . at his home, 84 Grove Street, Auburndale. He was born in Medfield and was graduated in 1889 from . . . Technology. After several years as research engineer for the Thompson-Houston Company, which later merged to become the General Electric Company, he joined his father's brick manufacturing firm, Fiske & Co. During World War I, he served as president and general manager of the Standard Roller Bearing Company, in Philadelphia. Later, he joined the General Motors Company, and became president and general manager of the subsidiary firm that developed refrigeration. In the 1920's, he pioneered in the sale of household heating equipment in this area, as the New England representative of the Nokol Corporation. Six years ago, at the age of 75, he developed a fuel compound to produce multicolored flames in open fires, which was sold under the name of 'Fire Magic'." — WALTER H. KILHAM, Secretary, 126 Newbury Street, Boston 16, Mass.

1891

Our old friend, Billy Dart, passed on at his home in Providence on November 17. He had not been well for several years and could not come to our 50th, but he did come to a dinner in Boston in January, 1942. As an undergraduate, and for some years thereafter, he was active in class affairs and attended many of our reunions. He was vice-president of the Class during our junior and senior years. Your Secretary called on him a few weeks before his death. It happened that our parents were close friends, and his father and my uncle, John Anthony, were president and treasurer of the Rhode Island Tool Company in the early Seventies. His mother and my mother grew up together in Fall River, and I gave him a very fine folding daguerreotype of

the two girls, taken when they were about 18 years old.

The following appeared in the Providence evening *Bulletin*: "William Cray Dart, for many years president of the Rhode Island Tool Company, vice president of the Morris Plan Company of Rhode Island and a director of the Rhode Island Hospital Trust Company, died . . . at his home, 16 Stimson Avenue, in his 78th year. He had been ill for about a year. Born in Providence, April 21, 1869, a son of the late William Burdick and Mary Elizabeth (Cray) Dart, Mr. Dart was a member of the Class of 1891 of . . . Technology, which he entered on completion of his secondary education at the former Mowry & Goff School in this city. From college he went directly into the Rhode Island Tool Company, a family concern in which his father and uncle were associated. Ultimately he became president of the concern and chairman of the board of management, offices he long held until he retired from active business in June, 1945. Keenly interested throughout his life in building construction, Mr. Dart's technological skills were sought by many concerns of the state when new structures were under consideration. Notable among these were the Rhode Island Hospital Trust Company of which he was a director and a member of the Washington Row committee which had to do with the construction of the present bank building, and the Morris Plan Company of which he was treasurer and director as well as vice president. When plans for the present Emma Pendleton Bradley Hospital, of which he was long a trustee, were being considered, Mr. Dart again gave his aid as a member of the building committee. As an active member of the Central Congregational Church, he was prominent in development of plans for erection of the present parish house. He was a member of the board of Swan Point Cemetery Corporation and the Providence Athenaeum and was a member of the Providence Art Club, the University Club and the Sons of the American Revolution. He long maintained a summer home at Saundertown. Mr. Dart leaves a daughter, Mrs. Henry F. Dunbar, and three grandchildren, Henry F. Dunbar, Jr., Miss Margaret Dunbar, and William Dart Dunbar. His wife, Grace (George) Dart died six years ago . . ."

We are indeed sorry to record the death of our friend and classmate, Roland H. Barnes, on October 4. Ernest Tappan attended the services the following Sunday, but most of us knew nothing about it until later. The following is from the Boston Herald: "Roland H. Barnes, 76, a civil engineer in Greater Boston for more than 40 years, died . . . at his home, 3 Bowdoin Street, Newton Highlands. Born in Waltham, he graduated from . . . Technology in 1891. He worked as a mining engineer several years in Mexico and the Southwest and then returned to Boston to practice civil engineering. He retired two years ago. He was a member of Monitor Lodge, A.F. and A.M., and the Highland Glee Club. Surviving are his wife, Mrs. Annie C. Barnes, and a son, Edward R. of Yarmouth." Roland was a regular attendant at our reunions and dinners, and came to our 55th last June. We all liked him. He had a sunny disposition, and his evident enjoyment of our parties added to our

pleasure. An excellent singer, he used to lead our song fests. We shall miss him.

The 55th reunion book was sent out just before writing these notes, and those sent to Fred H. Briggs and M. W. Greer were returned, address unknown. We heard from Bert Kimball not long ago that Greer, who was then living in San Francisco, had called on him at Redondo Beach, Calif. A recent letter from Lew Dunham from the Engineers' Club in New York, after acknowledging receipt of the book, reads: "It doesn't follow, because I don't come around, that I am not interested in the Class. In fact, last June, I almost got to the reunion — just missed it by an odd fluke at the last moment. Anyway, thank you a lot, and keep me informed as to goings on, and I'll try again to come over for the next shindig of any kind."

Another letter acknowledging the book, from Hanington in Denver runs as follows: "The 55th year book came yesterday, and I have read every word with great interest. You all evidently had a grand time. Howard told me about it when he was here. I am quite sure he will have some fine film to show at the next '91 gathering. I am slowly recovering from an auto wreck from which, unfortunately, I came out with a fractured hip bone. Eight weeks ago this very day. The doctor will not let me put any weight on my leg yet, but says everything is fine and I am not so young as I used to be. I have been at home for a month, have a wheel chair, and am up four or five hours a day, and on the sleeping porch in the sun, but it is hard to be cooped up in the house when I have almost lived outdoors all my life. You and your committee did a good job with the little booklet, and I congratulate you. I am glad to be one of the few who keep up an interest in '91."

Walter Douglass sends thanks for some Kodachromes that I took of his home in Dunstable, and some extracts from his letter follow: "You would have been interested to look out our west windows last Tuesday morning at seven o'clock. Right in the vegetable garden, not 100 feet away from the house, were four deer eating the tops off of carrots and beets, and down over the brow of the hill toward the pine grove were three more of them, too timid to come up to the garden. Seven deer in one's back yard at one time is a record. Mrs. D. saw five one morning two years ago. The most we ever saw on the meadow at Quickwater Farm was three at a time. Last week at about 8:30 A.M., there were four pheasant out in the field, three cocks and one hen, all calmly feeding on seeds of grasses. The fall crop of hay had been cut and harvested recently. So you see there are advantages to living in a backwoods town 35 miles from Boston. We have had a pleasant summer here, and have been away on short motor trips to the White Mountains, to Maine beaches, and up through Vermont to Burlington and across Champlain by ferry to Port Kent, and have visited historic points of interest about Champlain and Lake George. But we are always happy to return to our own home in the country, with its simplicity and peaceful views of mountains and valleys."

Ed Smith of Providence sends in his thanks for the class book: "It is too bad that I could not make the reunion. What amazing changes have taken place since we haunted the corridors of Rogers and

Walker, and the old Drill Shed on Exeter Street. As I recall, a General Moore was our drill instructor. I fear the technique we picked up would hardly have qualified us as military experts today. The long list of those who have been graduated from Life's University is noted with a feeling of sadness. I am reminded of the talk we received at the beginning of our sophomore year when we selected our courses. The Professor's name is not recalled, but some of his words were remembered well: "Some of you young men fancy that upon graduation you will become full-fledged engineers fully capable of coping with life's problems. Let me tell you that here you are only in the kindergarten. Your real education will come when you touch elbows with trained engineers and learn to apply the principles learned. We shall be grateful if we shall have competently inculcated those principles." Those are not his precise words, but I believe the purport is accurate. How many have applied those principles competently and adequately and have finally been graduated to the Hereafter with the *cum laude*, 'Well done, good and faithful servant!' Thus has M.I.T. become great and shed a great light over all the world. There is much more to be accomplished, much more opportunity for achievement in which we oldsters can have a part. Tell Frank Howard I wish I could have seen his pictures. Kodachrome is my only hobby, and I am only an amateur but do enjoy it."

Soon after our 55th, Ernest Tappan wrote to several who were unable to come, and some letters resulted, mostly written in July. He recently sent these to me, and a few extracts may be of interest. From Bert Kimball, Redondo Beach, Calif.: "I was sorry enough to have missed this special event; our having other uses for the money was the principal reason. Although we should have liked to make the trip in order to see my daughter and grandson, there was a possibility of having them out here to spend the winter. That possibility now becomes almost a fact, as we have learned that they are making plans to leave late in August or early in September. So you see what that means! As my younger sister and her husband are to spend the winter with my older sister in Santa Barbara, we expect to have many family parties. My wife, who has not been in the best of health for the last two years, has picked up wonderfully on learning the good news of my daughter's visit and is now making plans and changes for their comfort. We have been here now 10 years, and I have it quite well settled in my mind that it is a good place for old people. I really enjoy taking care of growing things in the garden, especially the shrubs, which are doing very well, if blossoms are evidence. I find plenty to do, and as we have an excellent public library, we do not lack reading matter."

From Ernest Hersam in Berkeley, Calif.: "I should have been glad to be there with you, hail, wind, squall, tornado, sunshine, and all. Life is pleasant for me, in the main, way out here on the West Coast, but the undertakings have to be simple, and the enjoyments and expectations kept patient and moderate. Although $F=ma$, the time element measured up to 75 years or so throws the computation all haywire."

From Ambrose Walker, then in Lexington, Mass., now in Winter Park, Fla.: "I

was sorry, very sorry, not to be at the reunion. We arrived here rather too late, for I had been in bed six weeks in Florida, and was told by our doctor not to go to the seashore on account of my serious bronchial trouble. All told, it was too bad, for there are not many reunions left to us."

From Joe Warren at Cumberland Mills, Maine, who expressed regrets at not being able to attend out 55th and said: "I am well and still enjoy life with the assistance of quite a family. I am going to make an effort to attend some of the get-togethers this winter as I suppose there will be an opportunity to meet some of you around Boston."

From Charlie Garrison, then in Victoria, B.C.: "We are on a trip with our son Robert and his family, a boy 18, and a girl 16. We have covered more than 3,100 miles so far. They left today for Vancouver to take the trip to Alaska by boat, and upon their return, in about 10 days, we shall motor home. We took the Alaskan trip several years ago and found it delightful. Upon the family's return, we plan to join them at Vancouver and start our journey homeward through Washington, Oregon, and California. We enjoy life in Santa Barbara, where we have many friends, together with my sisters Agnes and Eleanor, who live near us. Brother Frank has been there for several months and has just returned to his place in South West Harbor, Maine. We have missed not being able to motor for the past five years. In the past we have driven across the country 10 times and north to these parts some five times. Our son is a successful petroleum engineer, and our daughter is in Berkeley, working in the Children's Home Society for adoption. Our granddaughter is at the Milton Academy, to get a little eastern atmosphere. *Tempus fugit* — last fall we had our golden wedding anniversary."

From George Spooner in Maplewood, N.J.: "Many thanks for the newspaper clipping regarding the New Bedford trolley system. I was much interested because I was in at the start of that system. I helped set up, and afterward ran, the first electric generator. It was a four-pole compound General Electric dynamo, then a new type, and we had difficulties with it by which I learned much. Even the G.E. didn't know too much about compound machines in those days." — HENRY A. FISKE, *Secretary*, Grinnell Company, Inc., 260 West Exchange Street, Providence, R.I.

1893

Charles Green Waitt, a member of our Class in Course XI during three of the four years he attended the Institute, died at his home in Brighton, Mass., on November 3. He is survived by his wife, the former Margaret V. Caulfield, whom he married in 1900; two daughters, Mrs. Eleanor V. Goldthwaite of Boston and Mrs. Esther W. Rafferty of Cincinnati; and a son, Charles L. Waitt of Portland, Maine. Immediately after leaving the Institute in 1892, he designed and erected several large brick business blocks in the suburbs of Boston. The next year he opened an office for the practice of general engineering, specializing in surveys, reports, and designs for water and sewerage systems for a number of small towns and cities, and for several years was engaged on work for the Massachusetts Metropolitan Sewerage

Commission. As the appointed representative of the American Society of Civil Engineers and the Boston Society of Civil Engineers, he attended the meetings of the International Convention of Civil Engineers, held in London and Paris during the summer of 1900. Soon after this appointment, he spent several months in England, France, Germany, and Italy. On returning home he was employed by the Travelers Insurance Company, from the spring of 1901 until 1925, when he was engaged as foreign correspondent for the London *Times* and the London *Daily Mail*, covering Germany, France, Czechoslovakia, the Balkans, and Russia.

The following excerpts from a letter dated May 31, 1943, and received at the time of our 50th anniversary show some of the contacts established and the scope of his work as a newspaper correspondent, leaving "vivid recollections of the years spent in Germany and the Balkans. At that time Germany was furiously rearing, but even before Hitler was vested with the power of president and chancellor combined, his savage butchery was evident in his purge of June 30, 1934, when he executed without trial more than 200 of his followers, many of whom were his personal friends. The writer was in Berlin at that time and in his columns to the London *Times* he drew attention to the fact that the killing off of leaders, however dangerous to public order and worthless from a moral standpoint, without the least shadow of a trial and without the slightest chance of self-defense, is repugnant to a civilization built up since the barbarism of Roman decadence and the Dark Ages. Even the best friends of the German people at that time were unable to restrain expressions of horror at such things happening in this 20th century. The fact that there was no such reaction in Germany was even more depressing. At first sight it seems to justify the cynics who like to repeat that civilization is but a thin veneer covering man's unchanging brutal instincts. Certainly, June 30 in Germany might have been a day in the declining period of the Roman Empire. To more than one reader, as the grim drama unfolded itself in the news dispatches, there must have come reminiscences of some of the bloodiest pages of Gibbon's *Decline and Fall*. The praetorian guard plotting the downfall of the deified Emperor or Dux; the leader himself scotching the plot with his loyal cohorts; the slaying of the plotters and the offer of the poison phial to the leading conspirators; the arrest and stabbing amid orgies of base pleasure; nothing was wanting to complete the parallel with the days of Nero, Commodus, and Heliogabalus.

"This backward plunge into the past was possible only because of the regressive evolution which had been going on in Germany for months. It is the leaders of National Socialism themselves who have boasted and gloried in the suppression of free expression of thought in their country. In their deliberate policy of putting intellect in the shade and putting emotion and force in its stead, they have been seconded by a majority which has supinely followed their lead to the extent of making a religion of a political movement and deifying its leader. It is the history of the delirious Roman crowds acclaiming their 'divine'

emperors all over again. It would be entirely wrong to blame the German people as such for this regress. No country, no people, is safe from it in a period of economic distress and increasing poverty. In such conditions the crowd is in an abnormal state. It becomes the plaything of adventurers who know how to play upon its emotional psychology. The unthinking masses become their victims, and the movement may take such proportions that ordinary thinking men and women may be caught in the maelstrom. It is up to the intellectual class not to be shaken off its feet. The events in Germany on June 30, 1934, and the subsequent executions in Bohemia are not so much a subject of condemnation as a lesson to every country wherever the masses are turning for guidance in their economic suffering. This incident of Hitler and his Nazi gangsters is still very vivid in my memory, for the writer was there at the time, on the stage and close to the actors.

"Coming events cast their shadow before." Germany was rearming, and the whole nation was inspired with the idea of retrieving and avenging their defeat in World War I. They had risen from the pit of disaster in monstrous guise: hatred internal and external, organized as if it were a science; debts repudiated to buy means of making cannon; treaties broken to construct a huge air force; schools placarded with maps of territories to be regained; the whole German nation, seventy million of the most industrious, valiant, gifted people in the world in the hands of a small group of fierce men, with a leader in whom more power rested than the Czars of Russia ever had — Hitler, whose whim and word is law without appeal. It was this fear of Hitler and his immediate officers second in command that made my work as journalist and foreign correspondent for the London press both easy and at the same time dangerous in the extreme. It was made easy by my making friends of Goering, Himmler, Solmitz, and other high officials from whom I obtained letters to the commandants of army and air bases, munition factories, and even to Helgoland, all of which enabled me to obtain firsthand news. It was also equally dangerous because if I had made one slip and had been even suspected they would have killed me without even a trial at the People's Court. I had one close adventure but was saved by Major A. D. Solmitz in charge of the Gestapo under Himmler at Hamburg, but that is another story too long for now — for I have let my thoughts run along too far and must close these few remarks."

Waitt published many articles in the English journals and some in the *Boston Globe*. He lectured many times at the Army and Navy Club, the Wellington Club in London, as well as other associations and societies in London. — **FREDERIC H. KEYES**, Secretary, Room 7-211, M.I.T., Cambridge 39, Mass. **GEORGE B. GLIDDEN**, Assistant Secretary, 551 Tremont Street, Boston 16, Mass.

1895

With the passing of our mutual friend and classmate, Henry Docker Jackson, the Class has lost one of its most sincere and unique characters. Henry passed away at his home, 29 Noyes Street, Concord, N.H.,

on October 12, after an acute heart attack. In the last few years his health had begun to fail but he had held his own so that he was able to attend and enjoy our 50th reunion and the 50th reunion of the Class of 1896. Jackson began his engineering course at Technology with our Class but on account of illness was delayed in his studies there until 1897. At the Institute, Henry knew intimately his own classmates and many men of other classes; he had the distinction of being actively connected with the Classes of 1895 and 1896; and his interest and loyalty to Technology as a whole in its everyday affairs was never lagging.

Among the properties of our Class are found the movie films of the activities of our outstanding reunions, which are always enjoyed by our fellows at subsequent gatherings. He was our class representative on the Alumni Council for many years, and it will be a great task for your Secretary to find someone who will take his place on the Council.

His first business connection, after graduation, was with the firm of Monks and Johnson, architects and construction engineers. From 1898 to 1900, he served with the General Electric Company, on the calibration of voltmeters and ammeters; from 1900 to 1903, with the electric department of the Boston Elevated Railway Company, as engineer; from October, 1903, to early 1904, as superintendent of tracks and wire. From 1904 to 1907, he was in business for himself making reports on electric railway matters and rehabilitation of electric light and power plants. From 1907 to 1912, he served as consulting engineer with T. W. Sprague '87 on power plant work for coal mines and other properties. In 1912, his health compelled him to take a year's vacation. During 1903 to 1906, he lectured at the Institute on electric railway construction and operation.

At the outbreak of World War I, he engaged in the design of improvements in aeroplanes and depth bombs, advocating the possibility of exploding depth bombs at certain depths in place of time-bomb explosion. In January, 1918, he returned to his former connection, Monks and Johnson, and remained with them for a number of years. During recent years, he was representative, in New England, for several valve concerns, and concentrated especially on the use and sale of packing for all kinds of services.

Henry's honesty and integrity toward all his friends and many acquaintances could never be questioned. His loyalty and faithfulness in serving his alma mater, and his class spirit, under all circumstances, are striking monuments to the memory of his life service. Mrs. Mabel P. Jackson and one married son survive him.

Your Secretary is glad to report the growing interest in our 55th reunion in 1950. Wonderful! — **LUTHER K. YODER**, Secretary, 69 Pleasant Street, Ayer, Mass.

1896

Two letters have arrived recently from Lloyd Wayne in Indianapolis, and he supplies some items of news. He says that Joe Stickney has recovered very nicely from his operation and is now back from the hospital and on his job full time. He says also that he had visited Andrew in Cincinnati

early in November and found him looking fine and also acting like himself, but he was leaving according to plan almost immediately for California for a period of thorough rest for his heart, being under doctor's orders to go very slowly and do nothing at all strenuous. Wayne has suffered the misfortune of losing his old canine pal, some 10 years of age, who passed away after a brief illness, and now Wayne has the problem of finding some other excuse for his morning and evening walks.

Another honor has come to Will Coolidge, when he recently became an honorary member of the Société Française des Electriciens.

The Secretary paid a visit to the M.I.T. Club of Central Pennsylvania in Harrisburg on October 16, and enjoyed the pleasure of meeting Lou Morse there. Lou was looking fit and reported that Mrs. Morse was improved in health. The Secretary also made one of his periodical trips to the Tuckers in North Andover on November 11 and enjoyed one of Bertha's fine dinners. Charlie's apples had all been picked, which was not so much of a job this year because of a considerable reduction in the crop. He also said that because of the warm weather all through the month of October winter apples had ripened away ahead of time and consequently were not going to keep well during the winter. He and Bertha had recently made a trip to New York and had tried to see Father Partridge, but without success, as he had apparently recovered sufficiently from his recent illness to start for the South in his trailer.

Charlie, as chairman of the Sons of the American Revolution committee on memorials and markers, received some publicity in the Boston papers on the ill-kept old Chestnut Hill Cemetery in Sharon, Mass. There are now two groups interested in restoring and preserving the cemetery, the Sons of the American Revolution and the Sons of Union Veterans. Charlie is quoted as saying that it is the duty of the town to take care of the graves of soldiers, and he quoted laws which provided that a town shall appropriate money to care for abandoned graveyards within its boundaries and require the annual appointment of a veteran to see that every cemetery where there is a grave of a soldier or sailor is suitably kept and cared for.

Lythgoe has sent a reprint of a joint paper by himself with E. B. Boyce and L. E. Filios on "Vitamin A Deterioration in Oleomargarine," which appeared in the Food and Drugs official *Quarterly Bulletin*, Vol. 10, No. 3, for July.

We have to report the loss of another classmate in the person of Lewis T. Cannon, who passed away suddenly in his office in Salt Lake City on October 10. He was senior member of the architectural firm of Cannon and Mullen and had held a prominent place among Salt Lake City architects for nearly 40 years, during which time he had designed many large buildings, schools, and churches in the district. He was the oldest director of the Zion's Savings Bank and Trust Company and had also served in various capacities in the Latter-Day Saints Church. Among his church activities was service as a member of the general board of the Young Men's Mutual Improvement Association for more than 30

years. For four years he was a member of the 33d Ward Bishopric, and at the time of his death he was a high priest in the South 20th Ward. He had filled a mission for Germany for the church. Beside his widow he is survived by a son and three daughters. Your Secretary had seen Cannon at various times whenever making trips across the country and having opportunity to stop in Salt Lake City, and it always was a matter of regret to Cannon that he had been unable to attend any of our class reunions and thus renew acquaintance with old classmates.

It seems that the time is ripe for another of Bob Flood's stories, so here it is, as related to him by S. D. Flood '90: "One night Sumner Ely '90 came into Mrs. Burse's boardinghouse on St. James Avenue with a snake. 'Sumner Ely,' cried Mrs. Burse in consternation, 'you take that snake right out of here, you can't have it in this house.' 'But Mrs. Burse,' replied Sumner, 'it's perfectly harmless, see —' and he put it on his arm and stroked it. 'I don't care, I won't have it here.' 'But Mrs. Burse I only want it for company, I won't let it out of my room.' The argument was fast and furious, but Sumner kept the snake and took a glass of milk up for it every night with Mrs. Burse's permission. Some weeks later Sumner went to Providence, R.I., on a debating team. 'Mercy,' said someone, 'the snake!' The braver ones armed themselves with canes and umbrellas and went a-hunting. Back of the pictures, under the bed, under the dresser, everywhere a snake would be likely to seek refuge. But no snake. 'Try the closet,' someone suggested. So everyone got out of the room, but one, and he turned the knob of the closet door, and out flew everything, including a hatbox with air holes punched in it. 'That's it,' someone said. 'And deader'n a door nail, I bet yer,' said someone else. They pried the lid of the box off and there was the snake, none the worse for wear, but no signs of life — a paper snake. 'And Sumner's been bringing a glass of milk up for it every night all winter and drinking it himself! Better not tell Mrs. Burse about this,' someone said. 'Why not?' someone answered. 'What difference would that make? Sumner'd talk her out of it, you know he would.' " — CHARLES E. LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge 39, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge 38, Mass.

1897

Your Secretary wishes to report that at this time of writing (November 18), the committee has no announcement to make relative to our 50th anniversary reunion in June, 1947. In an endeavor to learn what the wishes of the fellows are in regard to the nature and place of the reunion, questionnaires were sent out in August with the request that they be returned with the answers thereon, or that separate letters be written to the Secretary, indicating the preference of the men. Up to date replies have been received from but 17 of the Class. As one member of the committee expresses it, "I am sorry that only 17 men have taken interest enough in the reunion to bother to answer your questionnaire. It does not give any committee a very enthusiastic feeling to go ahead and do any work with such a small percentage of the Class show-

ing interest." Surely there will be more than this number who will come to the reunion, so let us have your ideas on the subject as soon as possible for the time is getting short. — JOHN A. COLLINS, JR., *Secretary*, 20 Quincy Street, Lawrence, Mass.

1898

Speak of angels and they flutter in. In the last issue of *The Review* it was suggested that Charles Godbold write us about his life in Washington. Almost by the next post came the following letter, forwarded by Arthur Blanchard, from Proctor L. Dougherty '97 of the executive committee of the Washington Society of the M.I.T.: "I am sending you this bit of news, that as Secretary of the Class of '98 you might have published in your class notes for *The Review*. In a ceremony especially arranged at the request of Vice Admiral Cochrane '20, Chief of the Bureau of Ships, on May 25 at Commodore Paine's office, Terminal Island Naval Shipyard, Charles H. Godbold of Tarzana, Calif., was presented with the Distinguished Civilian Service Award given by the Secretary of the Navy. Mr. Godbold's citation read: 'For distinguished service to the United States Navy while serving as head of the hull design drafting section of the Bureau of Ships during World War II. By reason of his exceptional technical skill and intelligent supervision, Mr. Godbold rendered outstanding service to the Navy in the preparation of hull contract plans and specifications for new naval vessels, conversion of naval vessels, and major alterations to ships in service. . . . During the war period and the immediate pre-war period, Mr. Godbold exerted an important influence on the quality of the designs of many ships serving in the war. . . .'

"While writing, I might add that for many years during the early period of the Washington Society of M.I.T., Godbold was its treasurer. Those were the days when the Society's bank balance was frequently a minus quantity and the treasurer had to create balances from his own pocket. He served the Society long and well. His retirement from the Bureau of Ships is well earned." Congratulations, Charles, and thanks, Proctor!

Charles S. Hurter writes from East Orleans, Mass., the following interesting travelogue: "After I retired in 1932, I tried to do some playing while the playing was good. In the summer of 1932, I made my first trip to Europe, by the route from West Montreal to Belfast and returning from Liverpool to Montreal. We visited North and South Ireland, Scotland, Wales, England, Paris, and Switzerland. The first two winters I spent in St. Petersburg, Fla., playing shuffleboard. Each winter I made a trip to Havana. The first time, we took a bus trip to Santiago and back. The next was a Mediterranean cruise, stopping at Funchal, Gibraltar, Cadiz for Seville, Tangier, Málaga, and Algiers. I had a stomach hemorrhage from a varicose vein; so they put me ashore at Cannes, where I spent two weeks in the English hospital. I missed Egypt, the Holy Land, and so forth, but went by train to Venice, stopping over at Milan for 36 hours to visit the cathedral. We met the *Statendam* at Venice and then visited Taormina (from Messina), Naples, Monte Carlo, and Rotterdam. Here we

visited The Hague, Amsterdam, Delft, and so on, before returning to the ship for New York.

"The following winter we went all the way around South America through the Strait of Magellan. We stopped at Havana, Panama, Callao for Lima, Mollendo for Arequipa, Valparaíso for Santiago, Magellan (Punta Arenas), Mar del Plata, Montevideo, Buenos Aires, Santos for São Paulo, Rio de Janeiro, Bahia, Trinidad, and Nassau. The next year, from Boston, we took the Canadian National cruise through the eastern West Indies to Georgetown, British Guiana, and back. That summer we took the North Cape cruise and saw the midnight sun. We visited Iceland, Hammerfest, the North Cape, went up some half dozen or so fiords, and stopped at the Island of Visby, Leningrad, Helsinki, and Stockholm. We left the *Kungsholm* there and crossed Sweden in a little boat through the Göta Canal to Göteborg, where we got the *Kungsholm* for New York. The next winter we took an ordinary 18-day cruise to the Caribbean, calling at San Juan, Martinique, Barbados, Trinidad, La Guaira for Caracas, Curaçao, Cartagena, Colón, Jamaica, and Havana.

"Our last cruise before the war was the American-South African Line cruise to South Africa. The first call, St. Helena, was 16 days from New York. It took six days more to raise Cape Town, where we left the ship to visit Kimberley, Johannesburg, Pretoria, Kruger Park, Bulawayo, Victoria Falls (four days), and Beira in Portuguese East Africa. There we caught the *City of New York* for Dar es Salaam, Zanzibar (free port, everything cheap) and finally, Mombasa. As the weather was very hot there, we went inland to Nairobi, at 5,000 feet elevation, for the stay in port. Returning to New York, we called at Durban, Port Elizabeth, Mossel Bay, Cape Town, and Trinidad. The war broke out before the boat completed the next round trip. In 1940 we made a journey by rail to Mexico City, stopping at San Antonio for a day and returning via El Paso (Carlsbad Caverns), Denver, and Idaho Springs, Colo. The next year I made a lone trip, trying to find old friends in places where I had been, El Paso, Chihuahua, Mexico (called on John Goddard, now deceased), Bisbee, Ariz., Tucson, Los Angeles, San Francisco, Seattle, Vancouver, and Ladysmith, B. C., Denver, Idaho Springs, Colo., and home via Chicago. The year 1942 included a jaunt to the West Coast with side trip through El Paso to Mexico City and return via Guadalajara."

Boy, what an odyssey! Ulysses only kicked around the Mediterranean for 10 years. What was the matter with Asia, Charlie? You must compare notes with the other '98 globe-trotters, George Cottle, Lester Gardner, Clarence Goldsmith, and Bob Wallace. Is there any other unrevealed '98 Gulliver, who will write us about his travels? Thanks, Charlie, for the painstaking letter and the inspiration. And now for another note. Charlie's letter continues: "After that I was laid up and eventually lost both legs below the knees, from hardening of the arteries. I get around after a fashion with two artificial legs and two canes. Good luck and best wishes!" We admire your pluck, Charlie, and trust you and your wife will take many more trips.

Edward N. Milliken, from 56 Bush Street, South Dartmouth, Mass., writes: "Enclosed is a brief sketch of my life. I am wondering whether you remember me personally, for I have not attended any reunion of the Class. We were both at the same long lab desk in qualitative analysis under the tutelage of 'Don't-give-a-damn' Walker, I being nearer the office door and you near the window of the outer wall. I left Technology in the fall of '96 because of ill health and money trouble. But in 1907 I secured a B.S. in Education from Columbia, in 1910 an A.M. in Education from Columbia. From 1910 to 1912, I was an assistant instructor in chemistry at Columbia, from 1909 to 1912, lecturer in the general chemistry extension course at Columbia; from 1914 to 1915, instructor in mathematics at the Boston Normal School; and thereafter principal and instructor in secondary schools. During World War I, I served as a chemist in the New Bedford Gas and Edison Light Company. In 1932, I married Mary Alice Chase. In World War II, I was an observer and helper in keeping the home fires burning, having retired from active business and teaching. I am still interested in physics, chemistry, general science, education, and church work and hope to attend our 50th reunion. My residence is 56 Bush Street, South Dartmouth, Mass., from May to November, and 303 County Street, New Bedford, Mass., from November to May." Thanks for your letter, Ed, and for your loyal support of the Alumni Fund. See you at the 50th.

Our Class Day prophet, Jack Blecker of Blecker Hall, Virginia Avenue and New Street, West Chester, Pa., writes: "Your note on the back of the letter of August 15 about a principal contribution has been with me on my weekly travels for some time, but even though the subject you ask me to write about is the most interesting of all to any writer, namely himself — not until we put the clock back have I had time to answer. Perhaps I shall be able to donate something to the 50th gift fund. My present job is that of field supervisor in the Pennsylvania state service of the United States Employment Service of the Department of Labor. I don't have quite the responsibility I had for some years with five children and four stepchildren to raise and educate, as they are now all grown, most of them married with homes of their own providing me with 10 grandchildren. My hobby is great-grandchildren, of which I should have some in a few years. I cover about 1,500 to 2,000 miles a month in my car in Pennsylvania visiting our 107 public employment offices or some of them and helping our staff to find jobs for veterans and others, so must stop for an early start tomorrow." Congratulations, Jack, for your success as a paterfamilias, and thanks for the letter.

Gentle reader, when you read these notes, there will be three months to the end of the Alumni Fund year. The Fund this year, as of November 1 for the Alumni as a whole, is ahead of previous figures in total contributors and dollar value, but the '98 totals are a little below. This drop in position may be due in part to the '98 capital gift fund, which does not show in the running reports of the Alumni Fund Office (only the earnings from capital gifts showing the year after they are made) and partly to the fact that a dozen or so regular

'98 contributors respond toward the end of the Fund year. Whatever the cause, let us all do this year whatever we possibly can for '98 and the Alumni Fund. — EDWARD S. CHAPIN, *Secretary*, 114 Federal Street, Boston 10, Mass.

1899

Those of you who knew Ed Sutermeister, X, as an undergraduate know that when it came to loquacity he was second cousin to the clam. I judge he's mellowed a bit with age but is still not exactly garrulous. So I hardly expected to have an item about him.

He let himself in for something, however, when a biographical sketch by him appeared in the January issue of the *Paper Industry and Paper World* entitled "A Research Chemist Takes His Hair Down," figuratively speaking, of course, for like most of us — but that's got nothing to do with this story. Ed says he got into the paper industry by accident. But if so, it sounds like a happy accident for the industry for I hear from other sources that he is an authority in his line. That's what comes of sticking to one line through life. I've been nearly a third of a century in my present position, and I thought that was something, but Ed's got it all over me. Ed has made some discoveries in his time. Curiosity may have killed a cat, but it never killed a scientist. And I've made a discovery — Ed can write very interestingly. Ed has patents to his credit. So have I; but his bore fruit. Ed is the author of a book on paper-making that has run into several editions — and Ed doesn't like proofreaders. Then he wrote one with several collaborators — and Ed doesn't think much of collaborators. I guess I'll change my mind about writing one.

Ed has been called as an expert in numerous court cases and indicates that he got some fun out of it as well as some lucre. There's no better satisfaction than getting the best of an opposing lawyer. The medal of the Technical Association of the Pulp and Paper Industry was awarded him in 1935 for outstanding achievements in the paper world, and the vote of the committee was unanimous. Ed concludes, quite characteristically, that one drawback in being an expert is that when he says, "I don't know," everybody thinks he's lying. Evidently, he's got a load of satisfaction out of his life work, and that's something, Ed. — BURT R. RICKARDS, *Secretary*, 381 State Street, Albany, N.Y. ARTHUR H. BROWN, *Assistant Secretary*, 53 State Street, Boston 9, Mass.

1901

"Orlando S. Stockman, Assistant Secretary of the Armstrong Cork Company, Lancaster, Penna. since 1929, has retired after almost 43 years of service with the Company. He is a native of Newburyport and a graduate of . . . Technology." The above is quoted from the May issue of the *News*, Newburyport, Mass.

The July number of *Mining and Metallurgy* contained the following by Newell G. Alford about Frank Rash, whose death was reported in the July issue of *The Review*: "Frank Dillman Rash, member of the A.I.M.E. since 1905 and Kentucky director of Selective Service for the past six years, expired suddenly at his home, 55 Hill Road,

Louisville, on April 18, ending a prominent career in his profession, wherein his success was crowned by outstanding achievement in public service. Born in Hopkins County, Ky., and graduating from M.I.T. in 1901, Colonel Rash returned to western Kentucky where he rose from assistant engineer to president of the St. Bernard Mining Co. in which position he served with distinction from 1919 until this company was sold to the West Kentucky Coal Co. in 1924. Following a year of continuance with the new ownership, he established his family home in Louisville, where he has since resided. Active in the Kentucky National Guard from 1904, Colonel Rash served on the Mexican border in 1916, in the Inspector General Department, U.S.A., in World War I, later as Lieutenant Colonel, U.S. Cavalry Reserve, and until 1936 Colonel of the 149th Infantry, 38th Division. Prominent in the American Legion, Colonel Rash served as state commander of the Kentucky Legion in 1924 and 1925 and continuously since as Kentucky's member of the Legion's national executive committee. Since 1930 Colonel Rash was a member of the Louisville Sewer Commission. From 1932 to 1935 he was Louisville manager of the Reconstruction Finance Corporation, president of the Federal Land Bank of Louisville from 1935 to 1938, and a director of the Federal Reserve Bank of St. Louis until 1940. In 1940 Colonel Rash became director of Selective Service for Kentucky. A director of the Kentucky Old Mason's Home at Shelbyville, Colonel Rash was high in Masonic circles and active in many community welfare organizations. He was past president of the Kentucky Mining Institute and of the Kentucky Mine Owners Association."

The following is from an article by John Boyle, Jr., entitled "A University Course on Patents," which was printed by the *Journal of the Patent Office Society* for May. Because of the length of the article some details have been omitted: "In a recent lecture by George H. Young of the Mellon Institute, he said that few, if any, chemical or engineering curricula include courses in patent law and the patent literature is almost universally ignored in academic bibliographies compiled for thesis purposes. About twenty-five of the larger colleges and universities are sufficiently interested in patents to have well thought out patent policies affecting the rights of the instructing staff and the university on inventions made in university laboratories. . . . National organizations such as the Carnegie Institution, the Rockefeller Institute and the Mellon Institute also have definite patent policies. The medical profession has given careful consideration to the policy to be followed on patents relating to medicines. . . . In addition, there are several hundred industrial research laboratories in which technical graduates of universities are employed as research workers, nearly all of which have a definite policy, although they differ widely.

"No statistics have ever been compiled which would show the extent of direct interest in patents by technical graduates of universities whether as research worker, executive or promoter but it must be substantial and ever increasing. While some universities have attempted to meet this situation by conducting lectures on Patent Law, the result has been that very few

graduates have a working knowledge of the elements of procedure in securing patents or know how to read them to determine their scope, or how to avoid infringement or design around them.

"Probably our greatest potential source of inventions is our group of university-trained research workers, those working inside as well as those working outside the universities. In the forefront among these are the chemists; for a constantly increasing number of patents are granted on chemical inventions. . . . Indeed, for the very reason that the university research-worker has such great potentialities as an inventor, it is all the more essential that society take every step possible to make those potentialities realities, and to get the benefit of the realities by patents." . . .

"It is with the idea of imparting a working knowledge in a practical way to students and research workers that a proposed course for universities covering about thirty hours is outlined herein. The underlying principle is that the student is to learn to do by doing.

"The student groups or classes would be divided into three sections, mechanical, electrical and chemical. For these groups there would be provided certain selected sub-classes of patents and the patents in the selected sub-classes would be classified according to Patent Office classification. Probably about 1000 patents in each group would be sufficient. In the mechanical group, subclasses could be selected from Metal Working; Aeronautics; Internal Combustion Engines; Motor Vehicles; and Geometrical Instruments. In the electrical group subclasses could be selected from Radiant Energy; Electricity, Generation; Electricity, Motive Power; and Telephony. In the chemical group subclasses could be selected from Chemistry, Carbon Compounds; Chemistry, Fermentation; Foods and Beverages; Metallurgy; and Chemistry, Electrical and Wave Energy.

"Each section of the class of students would be divided into two groups, one to act the part of patent solicitors, the other to act the part of patent examiners. After brief class room instruction and having been given an opportunity to study a few simple patents to become familiar with the style in which a specification is written and to understand the purpose and character of a claim, the attorney student would be furnished a simple drawing of a patented invention or a chemical or electrical research report and would be asked to write a patent specification therefor and draw the necessary claims. The Examiner student would then make an examination of the application thru the prior art and act on the case thus prepared as if he was an examiner in the Patent Office. The attorney student would amend the application in the usual way. In order that the participants might have a check on their work, a copy of the file wrapper would be available when possible. It would be expected that the patents selected would have an exemplary file wrapper so far as preparation and prosecution is concerned. In addition to learning the elements of patent soliciting and examining, the student would be taught how to proceed with a validity or infringement search on a patent by making such a search thru the available classes of patents and writing an opinion.

"The successful operation of such a course of instruction would depend on the selection of the right kind of an instructor. . . . Lectures in such a course should be kept to the absolute minimum. There are available a number of excellent treatises on Patent Office Practice which could be made the basis of class-room instruction and outside reading. . . .

"While courses of instruction in universities provide the necessary educational background to make inventions and discoveries, little information is imparted to the student on how to protect the property rights thus created. While such a field is relegated to patent solicitors or lawyers, the major activity is technical and with only a minor amount of law being involved. Just as an architect must know the building regulations when he proposes to build, so ought the research worker know something about the rules and regulations governing the securing and enforcement of patent rights." GUY C. PETERSON, *Secretary*, 788 Riverside Drive, New York 32, N.Y. THEODORE H. TAFT, *Assistant Secretary*, Room 3-266, M.I.T., Cambridge 39, Mass.

1902

A letter from Redfield Proctor gave news of the sudden death of Harry Stimson in Pittsford, Vt., on October 15. It appears that since his retirement from the American Telephone and Telegraph Company two or three years ago he has spent most of his summers at Mrs. Stimson's old home in Pittsford, although his home was still in Maplewood, N.J., where his daughter, Mrs. Emil Hammond, her husband, and their little boy, lived with him. He had been living alone since September, getting his own breakfasts and luncheons usually and going out for his dinners. The letter states that on the night of his death he left earlier than usual after dinner, and it was thought he was not feeling quite well. Apparently, he drove home about seven and turned on one or two lights and went to his bedroom and lay down. The following afternoon a neighbor called and could not get in and was aroused by the fact that the lights were still burning. After inquiries at places where he would expect Harry to be with no results, he returned and got into the house and found Harry fully dressed in bed under a blanket and looking as though he had died in his sleep. It is believed he died shortly after coming home from the result of a shock and embolism. The funeral was held on the 18th, followed by cremation and interment in the family lot in Pittsford on the 22d.

Two other classmates have passed on, Ned Baker, who died on October 10, and Walter Fitch, who died on November 7. Both had been retired from active business for several years but had continued active in community affairs. The following is taken from the *Norwood Messenger*: "Edward S. Baker, for 33 years a member of the general staff of the American Tel. & Tel. Co., and a former Selectman of this town, died . . . at the age of 66. A civil engineer by profession, Mr. Baker served as a member of the Westwood Board of Selectmen from August, 1942, until March, 1943, by appointment, to fill an unexpired term. He was a native of Dedham, moving to Westwood in 1937. He was born on

March 16, 1880, the son of Lusher Gay Baker, Jr., and Adaline Swan Fisher of Dedham. A prominent athlete in his younger days, he played right end for the Dedham High School football team and captained the track team. In 1902 he was graduated from . . . Technology, where he captained the varsity track team. His first job was as a civil engineer with his cousin, Erastus Worthington of Dedham. He later went to Coeur d'Alene, Idaho, and while there was associated with the Coeur d'Alene & Spokane R. R., Ltd. Returning to Dedham in 1904, he accepted a position as an engineer with the American Tel. & Tel. and served on the general staff of that company for 33 years. He was the author of the present Bell System Standard Textbook. He was a deacon of the Allin Congregational Church of Dedham, curator of the Dedham Historical Society, trustee of the Dedham High School Scholarship Fund, member of the Constellation Lodge, A. F. & A. M., of Dedham, the Maplewood Chapter, R. A. M., of Maplewood, N.J., and the Westwood Square and Compass Club. Mr. Baker is survived by his wife, Mrs. Grace (Lindley) Baker, and one son, Edward S. Baker, Jr."

News of the death of Fitch on November 7 was received in a notice from the Boston *Herald*, which is given below: "Walter S. Fitch, 68, who retired five years ago as building engineer of the Dennison Manufacturing Company, Framingham, died . . . at the Newton-Wellesley Hospital. His home was at 27 Summit Road, Wellesley. He was graduated from . . . Technology in 1902. He was a member of the American Society of Mechanical Engineers, the Illuminating Engineering Society and the Wellesley Congregational Church. Surviving are his wife, a son, Wendell K. Fitch of Springfield, Mass., and a sister, Marietta Fitch of Rockville, Conn." Ned and Walter were both very active in class affairs and will be greatly missed. Letters have been sent to the families of both expressing the sympathy and sorrow of the Class.

Fred Hunter reports that he is for the fourth time a grandfather through the arrival of Joan Ingersoll Scott at Los Alamos, N.M., on December 29, 1945. Bert Sherman is again a grandfather through the birth of Sarah Swift Sherman on October 17. She is his sixth grandchild. — Adrian Sawyer, whose firm, the Sawyer Construction Company, is erecting the new million-dollar student center building for Northeastern University in Boston, assisted President Ell '11 in laying the cornerstone in September. The building will be one of the larger buildings of the university group. — Bert Sherman is serving as chairman of the recently established New England district committee of the American Society for Testing Materials.

A letter from Dan Patch tells of stopping off in Detroit and attempting to see Maurice Goldberg, whose office unfortunately was closed. At Buffalo he called on Nat Patch '01, from whom he learned of the illness and recent retirement of Frank Lane, who for a long time headed the Lane Engineering Company in that city. This is the first news of Frank's illness which has come to your secretary. Patch also tried to get in touch with Cecil Annett while in Camden, but as Dan puts it, "learned that he was another victim of this 'retirement at 65'

epidemic." He was at his summer home at Straits Pond, Hull, Mass., whence he was later found to be on the point of returning to his home at Moorestown, N.J. There Dan caught up with him and had a delightful visit with Cecil, his wife, son, and daughter-in-law. In Philadelphia our traveling representative sat beside Ben Lindsly '05 at the Technology Club and learned that our Lindsly, who has been with Associated Factory Mutuals, is another retirement casualty. At the same luncheon he met John L. Dodson '31, Norman Borden's son-in-law.

Plans for our 45th reunion are under way, and Charlie Kellogg has been asked by Les Millar to lead the movement and has accepted the job. His address is Langshaws, Queen Anne, Md. Send him your suggestions or thoughts in regard to the great event. — BURTON G. PHILBRICK, *Secretary*, 246 Stuart Street, Boston 16, Mass.

1903

Too late for extended notice in the November issue, we received newspaper clippings in regard to Walter M. Drury, III, who died in Santa Barbara, Calif., on July 17. With his wife, the former Mary E. Kane, he was spending the summer on the West Coast recuperating from an intermittent heart trouble from which he had suffered during the last year and a half. Before deciding on California, he had been to El Paso, Texas, on a business trip. Drury was born in Chicago, came to the Institute with our Class, and was graduated in the Mining Engineering Course. He entered the employ of the American Smelting and Refining Company and stayed with that company the rest of his life. From 1912 to 1944, he was general manager of the company's metal-mining department in Mexico. In 1944, he was elected to a vice-presidency, which position he held at the time of his death. He was also a director in several mining and rubber companies and belonged to several clubs in New York, where his home was. He is survived by his widow, one son and one daughter. He was an outstanding mining engineer, one of the distinguished members of the Class.

Of interest to the philatelists of the Class is the daughter of John W. Regan, II. As a captain in the Women's Army Corps, Mary J. Regan had a good deal to say about what the new German postage stamp will look like. She was one of three American judges on the inter-Allied commission to pass on the designs for the new stamps, and as an art expert she looked over some 6,715 designs which were submitted to the commission.

J. Howard Pew, II, President of the Sun Oil Company, was the main speaker last April at a meeting of the National Real Estate Foundation. Pew is an outspoken advocate of competitive free enterprise, and in accordance with this philosophy he has guided the Sun Oil Company from a volume of less than \$5,000,000 in 1912, to a peak of more than \$600,000,000 in 1944.

Myron Clark, V, is, as usual, busy with management conferences and problems. We hear from him as being in Gardner, Mass., for a series of round-table discussions early in the year, arranged for by O. B. Denison '11, Executive Secretary of the Gardner Chamber of Commerce.

Professor Locke '96 sends us the follow-

ing note: "Harry Bridgman Pulsifer, V, well-known metallurgical engineer and assistant to the president of the American Metal Treating Company, died on September 2. Writer, lecturer, and expert consultant, his advice was sought by many leading companies. For nearly a quarter of a century he had been active in metallurgical developments. Born in 1879 at Lebanon, N.H., he received his S.B. degree from Technology and went to work first as a chemist with the Henry Souther Engineering Company, then as an assayer for the Pittsburgh and Sonora Gold Mining Company, and then for the International Smelting Company. Mr. Pulsifer went into the teaching profession as instructor and assistant professor at the Armour Institute of Technology, going on to the University of Chicago, the Montana school of mines, and Lehigh before he went to Cleveland, where he was in charge of the development laboratory of the Beryllium Corporation of America. Later he was retained by the Ferry Cap and Set Screw Company, the American Steel and Wire Company, and the American Metal Treating Company, all situated in Cleveland." — FREDERIC A. EUSTIS, *Secretary*, 131 State Street, Boston 9, Mass. JAMES A. CUSHMAN, *Assistant Secretary*, 441 Stuart Street, Boston 16, Mass.

1905

Class notes seem to be getting scarcer and scarcer as the years go by. Men of our age evidently think there is nothing personal to write about after they pass 60, or that classmates are not interested in such things as grandchildren (or great-grandchildren), or retirements, or indoor athletics. Your Secretary, however, has learned that your classmates look eagerly for all sorts of trivia about you, your family, or your family's family. So loosen up and share with your buddies as you did in 1901-1905.

Speaking of retirements, Jim Barlow, I, retired in October after 18 years as city manager of Portland, Maine. Governor Hildreth and 400 state and city officials and friends gave him a testimonial dinner in appreciation of his splendid service for the city. After a brief teaching spell at M.I.T. and Brooklyn Polytechnic Institute, Jim served as engineer on the Charles River dam project in Boston, then as assistant engineer in Cincinnati, then as city manager in Dayton, Ohio, and New London, Conn. He will live at his farm at Sabbathday Lake, Gray, Maine. I tried to find Jim there one day in September, but he was away, and Mrs. Barlow stated that he had recovered marvelously from his very serious operation of nearly two years ago.

We are building up a considerable library of pamphlets issued by the Department of the Interior and written by Bertrand L. Johnson, III. Anyone wishing the latest on "Talc, Prophyllite and Ground Soapstone," "Nitrogen Compounds," "Phosphate Rock," "Calcium Compounds," or similar subjects can spend a profitable week in the Secretary's office, where, incidentally, he will find Andy Fisher and learn all about P.M., politics, Jim Curley, and "the most wonderful grandchildren." Admission free.

By the way, Andy had time lately to dictate this news item: "The Cape Cod cham-

pionship recently awarded to the various clubs was written up in the New Bedford *Standard*, and both Prince Crowell, and his son Sears, were among the first prize winners. Prince won the race over to Martha's Vineyard from Woods Hole, and Sears won the race back. Prince says the bottom of the ocean is too near the top at Wianno; anyhow, the grapevine tells us that in the final race he was stranded on a bar."

Walter Bent is permanently back from England, has purchased a farm at Old Lyme, Conn., and apparently is contentedly pursuing the job of town squire. His address is High Ridge, Neck Road, Old Lyme. Fletcher Burke, III, writes that he has been busy since January, 1941, on defense work. That now being completed, he has settled with his family at 1556 Northwest South River Drive, Miami 35, Fla. — We have noticed that Pete Harvey, VI, as president of the National Brass Forging Association, presided at the summer session in New York, bragged about research accomplishments in forging processes during the war, and not only predicted a big increase in business but also promised vast developments in the forging of aluminum, brass, copper, and magnesium.

Our Class seems to be doing its share in popularizing and perpetuating the new luncheon project at Thompson's Spa, 239 Washington Street, Boston. For the benefit of those so far unenlightened, M.I.T. men meet there informally on Mondays through Fridays, from 12:15 to 1:30, and enjoy good food and companionship. Just to show the others the old '05 spirit, we staged an '05 day on November 5 at which Loughlin, Files, Buff, Kenway, Strickland, Marcy, Goodale, Ayer, Fred Abbott, and Goldthwait were present. Seen there at other times were Shapira, Barrier, Fisher, and Chester Shaw. Loughlin has recently retired under the pension plan of the Factory Mutual Insurance Company. Kenway reported for Marcy that he had been doing great research work for Boston Woven Hose and Rubber Company. Marcy's son is now vice-consul at Athens.

Sam Shapira (whose new address is 100 Boylston Street, Chestnut Hill 67, Mass.) reports the incorporation of an import-export business with offices in Rome and Torino, Italy. His son, Norman, M.I.T. '41, now a major at the American Embassy in Rome, is a silent partner and adviser. Sam says all you have to do is to find someone in this country or Italy or Iran, who wants a few thousand of this or that and then find enough to fill the order. Gib Tower reports that he is still with the Navy at Quincy, but that although cruiser work (his specialty) isn't so good, he's "still hanging on."

Vice-Admiral Russell Willson is now just Mr. R. W., he having retired in September. His new address is 107 Hesketh Street, Chevy Chase, Md. Captain Ross P. Schlachbach is back at Newport News after a "spell" at Cleveland. Don't forget to send in news about yourselves. If you don't, I'll have to make it up, and that would be scandalous. — FRED W. GOLDTHWAIT, *Secretary*, 274 Franklin Street, Boston 10, Mass. SIDNEY T. STRICKLAND, *Assistant Secretary*, 69 Newbury Street, Boston 16, Mass.

1907

The funeral of Richard G. Woodbridge, Jr., one of the most interested and loyal of '07 men, formerly of 2407 West Seventeenth Street, Wilmington, Del., took place on November 9, Dick having died on November 7. Frank MacGregor, who sent me a clipping from the *Wilmington Journal*, telling of this event, wrote me that Dick had been away from his work resting on account of high blood pressure for a month and had returned to his office for about half a day's work for one week, but was stricken on November 2 and never recovered. I wrote to Mrs. Woodbridge and the children expressing personal and class sympathy.

Dick entered Technology from the Somerville, Mass., high school, and received his degree in 1907 in Chemistry. For the next two years he was research assistant on cellulose at the Institute, and then he became associated with E. I. du Pont de Nemours and Company, where he remained until his death. His first assignment there was in the smokeless powder division at the Experimental Station where he became division head in 1911. In 1915 he went to Carneys Point, N.J., as a rifle powder expert, returning to the Experimental Station in 1916, where he assumed charge of research on black and smokeless powders. In 1920, he was advanced to the position of manager of the cellulose division of the chemical department and one year later was made director of the Brandywine Laboratory of the smokeless powder department. In 1927 he became director of the chemical division of the smokeless powder department, and after 10 years was made assistant chemical director of the smokeless powder division, explosives department. In 1940, he became technical director of the military explosives division, and with the cessation of war activities last April, he was made technical specialist in the explosives department. He contributed articles on explosives to many scientific publications and took out several patents on inventions in the explosives field. He was a member of the American Chemical Society, the American Institute of Chemical Engineers, and the Army Ordnance Department; also of Immanuel Episcopal Church in Wilmington. He is survived by Mrs. Woodbridge, a married daughter, and a son, Richard G. Woodbridge, 3d, Princeton, '39, M.I.T. Graduate School, '40, and now studying for his Ph.D. in chemistry at the Princeton graduate school.

In the last issue of *The Review* we told of the death of Frank Shields. A clipping from the *Indianapolis News* of October 25 sent to me by John Frank, tells of legal problems involved in the gift by Frank's will of Foxcliff, his 700-acre estate, to the State of Indiana as a home for Hoosier governors. The will specifies that the property "shall be retained by the State of Indiana so long, and only so long, as the house in which I now reside can be used and maintained as a residence of the governor of the State of Indiana, and so occupied by the incumbent of such office." Frank's will further provided that the farmland in his estate should be maintained as a game preserve by the state. He also bequeathed \$2,000 to the M.I.T. chapter of Sigma Alpha Epsilon Fraternity, \$1,000 to the

Franklin College chapter of the same fraternity, and \$500 to the All Souls Unitarian Church in Indianapolis. Trust funds were established for his two daughters and his son.

Octavus L. Peabody, commonly known as Peabo, retired from active business on May 1. His health has not been of the best for three years. He and his wife have a nice home at 53 Abbott Road, Dedham, Mass., a suburb of Boston. The latching is out for '07 men. — Howard McChesney wrote me in October expressing his expectation of attending our 40-year reunion at Oyster Harbors on June 20-22, and added: "The two sons-in-law are out of the Navy, one after a brush-up course on naval architecture at Annapolis and three years at the Bureau of Ships, New York, winding up as lieutenant commander, the other after a year at Washington Personnel and about two years in the Pacific with a repair outfit based at Uluthi, finishing as full lieutenant. Our children are still three girls, one with a son three and a half and daughter, one; the second with a son three; the third, now 20, a little too young to fly the nest — at least so her parents think! I barged into the Philadelphia M.I.T. meeting last week and was glad to renew acquaintance with my roommate of our last reunion at Oyster Harbors, Hermann Mahr. No others from '07 were there. A very interesting and thought-stimulating talk by Major General Waitt '14 of the Chemical Warfare Service was followed by an excellent demonstration of mind reading by Mrs. Bell, with her husband, Dudley E. '17, as 'portable transmitter' roving through the crowd." Harold Wonson received the three following letters from which I quote. From J. E. Tresnon, 81 West Virginia Avenue, Phoenix, Ariz.: "I cannot come to Boston, much as I want to, since I cannot leave the dry atmosphere of Arizona. I do, however, enjoy being remembered. Give my best regards to '07 men who remember me." — From B. Karl Sharp: "How I should like to see you and have a game. I haven't for ages seen a soul who ever knew both of us. I am still fooling around boats. I don't expect to get to the reunion, for you hold it during that part of the year when I am really busy. Give my regards to any old acquaintances whom you see." Becky, who is an expert in the design of racing yachts, lives at 117 Sutton Manor, New Rochelle, N.Y. — From Kenneth Chipman: "Since I first got home in 1937, I have planned to come back for each reunion. 1942 didn't work out, but I hope 1947 will. This is an intention and a hope rather than a commitment." Kenneth is head of the Bureau of Geology and Topography of the Canadian Department of Mines and Resources, at Ottawa, Canada. — BRYANT NICHOLS, *Secretary*, 23 Leland Road, Whitinsville, Mass. HAROLD S. WONSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1908

The first dinner meeting of the Class for the 1946-1947 season was held in the Silver Room at Walker Memorial, M.I.T., on November 12. Sam Hatch, Jefts Beede, Miles Sampson, Linc Soule, Stiles Kedy, George Freethy, Winch Heath, Toots Ellis, Henry Sewell, George Belcher, Linc Mayo, and Nick Carter attended. Ray Drake had ex-

pected to be with us but couldn't make it. Bill Booth had to attend a Lions Club meeting; and Frank Towle, a Consistory meeting. Joe Wattles' Rotary Club meeting and Art Appleton's Stamp Club prevented their coming. The Technology Dining Service, as usual, served a fine dinner, while the gang carried on a lively talkfest, as to summer doings and news of other classmates.

Linc Mayo reported that the class treasury has a nest egg for our 40th reunion but that he will be glad to receive class dues from classmates who have not as yet sent in their checks. Winch Heath told us that he has now joined the grandfather division, thanks to the birth of his daughter's son.

George Freethy had brought his projector and screen and showed several very enjoyable Castle Films. Many thanks, George.

Jefts Beede told us of his experiences during last August, when he and his son, E. Bennett Beede '35, took part in the revival of the Glidden Tour, and showed us interesting newspaper reports. The *Buffalo Evening News* of August 20 had a very clear picture of Jefts' 1905 Royal Tourist proceeding down Main Street. It was captioned "An Old Champion Rumbles Down Main Street" with the further description: "One of the 80 antique automobiles which rolled down Main Street this afternoon participating in the revival of the historic Glidden Tours was this 1905 Royal Tourist made in Cleveland. E. Bennett Beede of South Lincoln, Mass. (left) drove and his father, E. Jefts Beede of Belmont, Mass., rode beside him. The engine in the car was a winner in the stock-car class in the 1904 Vanderbilt Cup Race." We understand that Jefts won a cup given by Mr. Firestone for having the second oldest car in the event. He hopes to be able to show us some of the colored film taken during the Glidden Tour at one of our later meetings.

As some of you know, there is now an M.I.T. luncheon club in downtown Boston at Thompson's Spa, 239 Washington Street, Boston, on Mondays through Fridays, from 12:00 to 1:30 p.m. Why not drop in some noon and meet old Tech friends and get acquainted with some of the younger Tech men?

Mat Porosky wrote from Moline, Ill., on November 8 as follows: "I am sorry that distance prevents my attendance at the first dinner meeting of our Class on November 12. I do hope I shall be fortunate enough to be at home on the date of one or more of the meetings this season, and I want you to keep on sending notices to me. Some day I shall be able to make it. You will remember the 1943 reunion and meeting my son, who was graduated with the February class in Course XV. He came down to our table, and I introduced him to those of our classmates who were present. He is now back from overseas with the rating of captain in the Signal Corps and is busy working for General Electric in Schenectady; he immediately decided that life alone was not worth while and found himself a very nice young lady who will become his wife on February 23. As for myself, I find that along with the reconversion of this plant, we have the problem of expansion and the necessity for erecting an additional building; all of which tends to keep me here somewhat longer but it does

not reduce the hope that I may soon be back in Boston permanently. If you ever get out to this part of the country, I do hope you will call on us."

Waldo Morrison wrote from New York City on November 11: "My delay in mailing a check to the Alumni Fund was occasioned by the visit I made to France this summer on behalf of the Unitarian Service Committee. My work there was to study replanning of bombed areas. Our nephew in Bourges is an architect in charge of that district. I had him for a guide and my wife for an interpreter. The Unitarian Service Committee is still very active in Europe, with more than 50 projects, including medical missions to Italy, Poland, and Czechoslovakia. I traveled about 3,000 miles in France all by train. Temporary bridges slowed the speed, and old equipment made travel very uncomfortable. All through trains were overcrowded, and on some trips we stood, or sat on luggage, for eight or ten hours at a stretch. This summer of 1946 was the first for a long time in which Frenchmen could go on vacations. They all went somewhere. In August, Paris was deserted. Returned soldiers had special travel rates for the whole family. People carried an enormous amount of luggage, boxes, and bundles with food and supplies. It was nothing unusual for us to put our suitcases and rucksack through windows of the car and to ask help from strangers in getting our luggage out of the corridor. I got a great kick out of the plane ride across the Atlantic via Air-France. We found a co-operative spirit and no strikes."

Congratulations and best wishes to Jim McGowan on his election last September as president of the Campbell Soup Company. Jim joined Campbell Soup directly on graduation in 1908. Shortly after, he was placed in charge of the Campbell laboratories and in 1914 became assistant general manager. In 1928, he became the first manager of the central division plant at Chicago. He returned to Camden in 1930 as production manager and in 1931 was elected a director and in 1939 vice-president.

Nick Carter's son, Richard '44, who served as a lieutenant during World War II, in the Army Ordnance and Transportation Corps, was discharged last July after three years of service and returned to Technology to complete his senior year. On October 4, he was married in New York to Nancy Jane Bell of that city.

Alton Cook, our Class Agent for the Alumni Fund, asks me to remind all those who have not contributed that we need their help, if the Class is to make a good showing. During the last two years we have lost by death several of our regular subscribers to the Alumni Fund. It's up to us who remain to maintain '08's position in supporting the Alumni Fund.

We are sorry to report the death on October 15 at Dubuque, Iowa, of Leo Nix. — We have received the following new addresses: Rae W. Davis, Lock Box 16, Madisonville, Cincinnati 27, Ohio; Charles A. Gibbons, Jr., 3072 Lakewood Avenue, Detroit 15, Mich.; Captain Edwin G. Kintner, 3005 32nd Street, Northwest, Washington 8, D.C.; Dr. Charles A. Kraus, 92 Keene Street, Providence, R.I.; Harry A. Rapelye, 1028 Connecticut Avenue, Northwest, Washington, D.C.; Charles McH. Steese, Las Vegas, Nev.

The second dinner meeting of the Class for the 1946-1947 season will be held on Thursday, January 9, at 6:00 p.m. in the Silver Room at Walker Memorial, M.I.T. Please note the change from our usual Tuesday to Thursday. The usual notices will be mailed early in January. Make your plans now to be with us and renew old acquaintances. — H. LESTON CARTER, *Secretary*, 60 Batterymarch, Boston 10, Mass.

1909

In the last number of The Review we recorded that Paul had generously made possible a new sailing dinghy for the M.I.T. squadron. Well, the big event of launching and the ceremonies connected therewith occurred shortly after noon on Saturday, November 16, at the M.I.T. Sailing Pavilion. As fate would have it, however, Paul was somewhat indisposed on that day, and his M.D. advised against his making the long voyage to Cambridge. We all realized that this must have been a major disappointment to him as it was to the rest of us, for his whole heart and soul had gone into it, but the events and spirit of the occasion have been relayed to him in some detail, and he now takes great satisfaction in the entire transaction. The Review Secretary, as well as Muriel, were fortunate to be among the guests and a firsthand report can be given. In the first place it was a warm, sunny day with a gentle breeze blowing on the river, and some 30-odd guests were assembled on the float. Paul was represented by his cousin, Richard Wiswall, who was accompanied by Mrs. Wiswall and their daughter Hope, the sponsor. The master of ceremonies was Professor Erwin Schell '12, who called the new craft the "cat's whiskers," since it is a prototype experiment and is feeling its way into the future. Its design, entirely new in the M.I.T. flotilla, warrants the "hope" that the boat will be even faster than those of the present design. The new model is a lapstreak, varnished cedar, Marconi-rigged, double ender, 13 feet, 2 inches long, as compared with the 12 feet, 6 inches of the present design. "Hope" is painted in gilt letters to port and starboard of her stern.

First Cousin Richard read a letter from Paul which spoke of his early aspirations to be part owner of a Narragansett Bay square-rigger. Stephen B. King '47 (of Course V, like Paul), Commodore of the M.I.T. Nautical Association, then introduced Hope, who therewith broke a bottle of Narragansett Bay water over the bow with the words, "I christen thee Hope." Simultaneously, "Anchors Aweigh" was most appropriately played by the background music. We heard next from Professor Emeritus George Owen '94, the designer, and Arnold Shaw, the builder, whom Erwin Schell called the "goats," for if the boat failed to float or refused to function, the blame would naturally be cast on them. Then Hope did something unprecedented for sponsors in launchings, for within three minutes after the launching, with tiller in hand, she was guiding the "Hope" out in the Charles. She with her orchid corsage and the dinghy with its full white sail did make a pretty sight. The Nautical Association presented Hope with a most unusual gift, a silver bracelet made of signal code flags which spelled out "HOPE MIT."

Many distinguished guests witnessed the ceremony, and we were particularly honored to have President and Mrs. Compton present, the President being an enthusiastic supporter of the sailing program. Then there were Professor and Mrs. Erwin Schell, Professor and Mrs. Bat Thresher '20, Bob Kimball '33, with whom Paul had so much correspondence when he was an honorable secretary, and Jack Wood '17, sailing master of the Nautical Association, who really was the key man in the entire affair.

After the launching ceremony, we all adjourned to Pritchett Hall as Paul's guests at a luncheon which included real roast beef *à la jus* and strawberry shortcake. Following the gastronomical ceremonies, the speeches took a most unusual but appropriate form, being addressed directly to Paul and recorded, so that he can listen to them later. Professors Schell, Owen, and Thresher, Arnold Shaw the builder, Hope and Richard Wiswall, and last but not least, President Compton, all told Paul what they thought of him and his boat, and won't his ears tingle when he plays back the records! Already '09 has made plans to play the records at our 40th reunion. The Review Secretary can report that the occasion was a most pleasant one, the entire ceremony was well planned and executed, and the guests were all pleasant and congenial. Paul and his devotion to the Institute were the high notes of the occasion. Even though he could not be present, I can report that probably nothing will ever give him more satisfaction than having had the honor of sponsoring an improved type of sailing dinghy for the Institute.

In the November Review we reported that Charlie Johnson, IV, was leaving the Brunswick Airport and returning to be librarian again at Putnam Valley, N.Y. We have since learned, however, that his services were too valuable to be released from technical work, particularly at this time. He writes: "The Naval Air Station closed on October 1, and the University of Maine took over with an extension of the campus at Orono. There will be 800 veterans in attendance. I had been working with the university representatives ever since they had been here; hence a few weeks ago they asked me to go with them and teach engineering drafting. I have never done any teaching, but they told me that I was the one they wanted for the job, and they made me department chairman. There will be three other instructors. In view of my past library work, I'm also to be assistant librarian. It will be an interesting experience. I have been twice to Orono, and Professor Kent, in charge of drafting, told me that the veterans are the grandest bunch he ever worked with. Dean Cloke said that the experience they had in the service has matured them and they are now eager to obtain an education. My services with the Navy terminated on September 27, and I had a week before I took up my new duties. I drove home for a few days and found that in my absence someone had broken into my house and stolen two antique mantle clocks and two rush-bottom chairs. I have burglar insurance, but I'm sorry to lose the clocks. One of them had a rosewood case, and my father had put an eight-day movement in it. I picked it up at Lake George 40 years ago."

Reg Jones, VI, has been appointed vice-chairman of the Standards committee of the American Institute of Electrical Engineers, and an account of his career, together with his picture, appeared in the November number of *Electrical Engineering*. This committee is an important one, since it is practically responsible for all important electrical engineering standards in this country and co-operates with the standards committees of other countries. — PAUL M. WISWALL, *Secretary*, 90 Hillside Avenue, Glen Ridge, N.J. CHESTER L. DAWES, *Review Secretary*, Pierce Hall, Harvard University, Cambridge 38, Mass. *Assistant Secretaries*: MAURICE R. SCHARFF, 285 Madison Avenue, New York, N.Y.; GEORGE E. WALLIS, 1606 Hinman Avenue, Evanston, Ill.

1910

The classmates in New York City are continuing to have periodic meetings. I received a notice of a get-together to be held at the Latin Quarter on November 15 and hoped to have a report of this meeting for this issue of *The Review*. But it will surely be in the next issue.

Jack Babcock sent me a booklet containing the following tribute to our former classmate, E. J. W. Ragsdale, by Edward G. Budd, who says: "We became acquainted after he [Colonel Ragsdale] had had varied experiences in many places and with many people and with various schools. He was a colonel in the United States Army. When World War I was over, we asked if he would join our company, which he seemed glad to do. At first his headquarters were in the experimental room, and he had as consultant Mr. Nikola Tesla. These were two men who could match wits and dream dreams. The work covered a wide range of speculation and experiment. Very little was accomplished during the period of Mr. Tesla's connection, but the writer must confess to a refreshing stimulation from these two men.

"More practical results came in the following 20 years and continuously. Colonel Ragsdale in his association with the writer and with all the others of our staff made himself an inspiration by his ability to look at each subject from a fresh angle. On the Thursday afternoon just prior to his passing, he arrived back from a trip around the country in which he had met many men in many cities and made several talks. He spoke to the engineers in the city of Montreal and received from them a life membership in the Canadian Railway Club. He also addressed on this trip the Society of Automotive Engineers in Dayton, Ohio. He felt that the trip had been successful from a business standpoint and a happy one personally.

"We both were invited to a meeting of technical editors the following week, and each was expected to give a talk. Colonel Ragsdale was absent from the shop the next morning, and his office reported he was writing his speech. He wasn't in Saturday, and Sunday morning we were told he had passed away. When I went to his house and sat down at his desk, I found the speech which he had written and which is included in this booklet, as well as the talk he had given at Dayton. When I saw him, he still had on his countenance the intelligent, inquiring, quizzical look familiar for so many years.

Frank Bell has again been awarded a further decoration for his services in the Corps of Engineers. This time it is the Legion of Merit, the citation of which follows: "Colonel Frank F. Bell, 0173171, Corps of Engineers, Army of the United States, for exceptionally meritorious conduct in the performance of outstanding services as Commanding Officer, 373rd Engineer General Service Regiment, Channel Base Section, from 15 September 1944 to 1 April 1945. Colonel Bell distinguished himself by the outstanding manner in which he directed the clearing and reconstruction of Le Havre, the greater part of which had been destroyed. Within a remarkably short time rehabilitation had proceeded to a point where the port surpassed its pre-war capacity. Due to his leadership, long, overburdened supply lines were greatly shortened, which contributed materially to the eventual success of the Allied Armies. Colonel Bell's service reflects the highest credit upon him and the armed forces of the United States."

In the correspondence I have had with Hadji-Savva, I requested that he write an article on some of his experiences in Greece during the war. Perhaps this restrained description may vividly portray what war really means to those who were in the theater of active operations: "I want to say a few words to Tech students, old and young. You are all so chaste that you cannot get a correct view of what vice and mischief have done to my little country. War brings all its horrors with it, and many of you have certainly known some of these horrors, having served under the glorious and noble flag of your big country, 'The Savior of Nations,' as I often call it. But I am not going to write history, or narrate in any way how it came to pass that on one autumn day of 1940 we were unjustly attacked by our elder sister in the Mediterranean, and how we punished her until a rude and ruthless Teuton, occupying the heart of Europe, was called to her aid, and how we were, ultimately, fettered, hands and feet, with a death sentence posted upon our front — no special heed being given as to whether we were to be executed by shooting, hanging, cold, hunger, or shame.

"Now for a few facts during the period of occupation, as my least intention is to bore you with generalities: Money had lost its value and railway artisans and workmen of the company, of which I am vice-director, were paid in cigarettes, olive oil or flour, an equivalent of five pounds of bread daily, for the sustenance of their entire family. As very little brain material was wasted in our work, I was paid an equivalent of four pounds (my pre-war pay was 130 pounds of bread daily). One pair of old rotten shoes was given by the Germans to the working staff during the whole period of four years but none to the directors, as the latter had the choice of walking 'over the paved sidewalk,' avoiding the street mud. Not versed in the art of stealing a German uniform, we had to go without clothes.

"We smoked a lot, as cigarettes are cheap in our country, but, on one occasion, I escaped certain shooting by running into the house from a veranda where I was sitting and smoking. It was a cloudless night when I suddenly heard the yell of a

German watch down in the street ready to shoot me, taking me for a spy giving signals with the lighted cigarette to British bombers (no such bombers appeared in our sky during the entire period of occupation). No ties (we call them sleepers here) were available, and I could only smile when my ganger assured me one day that we risked no danger of derailment so long as we let the grass grow in abundance over the track (ballast being considered a luxury) when we could safely rely, as he put it, on the anchoring power of the roots.

"Well, the disaster came in the end. The Germans, leaving the country late in 1944, considered that, since we had achieved the habit of living without eating, we could fare equally well without moving. So they blew up over 70 per cent of our rolling stock (engines and wagons) — the decision taken by the high command was to destroy it all — but then some little things in the neighborhood of 20 pounds of grapes, five pounds of cigarettes, four gallons of wine and four pounds sterling in gold, of course, offered by me to the inferior staff, as a token of 'good friendship' had a miraculous effect, so that our network in Thessaly was able to resume work in one month's time after the liberation, ahead of all the other railways in the country, our train attaining the dizzying speed of 15 miles an hour (we are not running at a higher speed even now because of tired engines, bad track, with the grass roots still serving for ties, and blown-up bridges). What we need most is ties and engines and again engines. But this is a matter I shall have to take up shortly with my old mechanical engineer friends of the Institute, whose wide experience will help me in the purchase, on the best terms, of a few American engines."

Charles Almy had the misfortune to have his home robbed last month, as reported in the Boston *Herald* of October 30: "The home of Charles Almy of 111 Coolidge Hill, Cambridge, vice-president of the Dewey-Almy Chemical Company and president of the Browne & Nichols School, was ransacked last night by thieves, who took jewelry, clothing and other articles, but missed a large sum of money." — HERBERT S. CLEVERDON, *Secretary*, 120 Tremont Street, Boston 8, Mass.

1911

With deep regret we report the death of one of our most loyal and active classmates — Hubert Stacy Smith, X — who died at his home in Bay City, Mich., on October 5 after a heart attack. He had returned only five days earlier from a month's vacation in Maine. A native of Bay City, Hank prepared for Technology at Andover and was a very active man on the campus during our undergraduate years.

He was a member of the class football team in both freshman and sophomore years; in the Tech Show chorus as a freshman; a member of the "Technique" electoral committee and Technique board; class treasurer in our senior year and a member of the Class Day committee. His fraternity was Delta Kappa Epsilon.

For the third successive year, our "Seven Come '11" dinner on November 7 at Walker Memorial, M.I.T., showed an increased attendance, with 24 present (23 in 1945, 21 in 1946). We were delighted to

welcome two first-timers — Munroe Pevear, IV, and Al Wilson, I — and two prodigals — Art Coupal, II, and Hal Jenks, VI.

In the talkaround, Pevear told us that after graduation he had practiced architecture for a few years and then became actively interested in the technical side of theater operation, finally going into color blending and eventually designing new light-projecting equipment. He told us of his work in charge of the lighting of both the M.I.T. Pageant in the Great Court in 1916 and the Plymouth Tercentenary Pageant in 1920. He and his wife live on Beacon Hill in Boston; but for the past 10 years after a severe phlebitis attack, he has been relatively inactive in business. (Two weeks earlier the Pevears had called on Sara and me in Gardner, just after closing their summer place in nearby Hubbardston.)

In addition to his duties as head of the A. O. Wilson Structural Company in Cambridge, in which he is now joined by both his sons after their war service, Al Wilson is now in his seventh year as consul for Sweden in Boston. In so far as he is able to get steel under present conditions, his company is very busy, Al told us, and his work as consul is highly interesting. The Wilsons also have a daughter, who is a Wellesley graduate, and five grandchildren.

Art Coupal worked at the Watertown Arsenal all through the war, but is now associated with the Holtzer-Cabot Division in Boston. He and his wife live in Wellesley, where he is a charter member of the recently formed Technology Club of Wellesley. Hal Jenks has for years been in the engineering department of the New England Gas and Electric Association in Cambridge, dealing mostly with transmission and distribution problems. During the past year, he has been on sick leave once or twice, finally having a leg operation for big veins, as a result of which his health seems improved. His son, out of the service, is now with Lockheed in Burbank, Calif.

Among the regulars some interesting developments were revealed in the talk-around. Ernest Batty, II, is still construction and maintenance manager for the Lincoln Stores in Quincy, while his erstwhile business partner, Obie Clark, II, still operates the Nelson Cement Stone Company, reporting that he is now back in building foundation construction on a big scale. A new item — "ultimite curb" — is proving very effective, containing as it does bits of granite at the top on curve curbs.

Marshall Comstock, VI, still with the Wagner Electric Corporation in Boston, said he was recently at a Massachusetts Aeronautical Association luncheon with Ken Faunce, VI, at which Luis de Florez, II, was one of the honor guests. He reported a third grandchild. George Cumings, VI, still a bachelor, has recently completed his 25th year with the New England Telephone and Telegraph Company and is particularly interested now in urban mobile service on F-M automobile telephone service. Dennie Denison, VI, still operating the Gardner Chamber of Commerce, like Comstock reported a third grandchild — this last one the Denisons' first granddaughter.

George Forristall, II, with the Harry Frost advertising agency in Boston, reported that his wife, Renée, was stranded

in Paris, while on a visit, by the Trans World Airline strike, but finally got a return trip on the *Isle de France* on November 13. George said that he was one of three members of his firm who created the Massachusetts "Had Enough?" slogan in the recent Republican sweep. Tom Haines, II, one of the several Boston Edison veterans present, said that he and Mildred had recently bought a new home at 107 South Avenue, Weston.

Fred Harrington, I, at the beginning of the war got into railroad administrative work and is now associated with the engineering firm of Whitman and Howard in Boston. He is still a bachelor. Stan Hartshorn, X, is still manufacturing baby carriages and furniture up in Gardner and "incidentally keeping an eye on Dennie." His son is back at the Institute in the second half of his sophomore year, after war service, while his daughter, who served as a lieutenant in the Waves, is now in the personnel office of Radcliffe College, of which she is a graduate.

Jack Herlihy, II, is now vice-president in charge of procurement, stores, and service for Boston Edison. Art Leary, XI, head of the mathematics department at the Hyde Park high school, gave us an interesting talk on the eager way in which G.I.'s are pursuing their studies at the Boston high schools, fitting into the educational and student picture at ages varying from 18 to 22. Uncle Roger Loud, VI, another Boston Edison veteran, who has recently completed his 31st year with that organization, said that one of the happiest days in his life to date was September 27, when his older son, Warren, received his doctor's degree in mathematics at M.I.T. His younger son is now a Technology freshman, after service in the Army.

Charlie McManus, I, still with the Massachusetts state highway commission, said his wife is eager to have 1911 reunions oftener than once every five years. How do you feel about it? Pat Merrill, I, retired, is a country gentleman at Milton and for several years has been devoting considerable time, as a board chairman, to hospital work. He spoke very interestingly about the plight of the hospitals today in trying to secure adequate personnel for effective operation.

Morris Omansky, V, consulting rubber chemist, spoke at length on the rubber situation and stated that native rubber is now coming into the country in increasing amounts and the real shortage is now of accessory materials, putting it up to the chemists to devise substitutes, just as synthetic rubber was the chemists' chief worry during the war. He said that the Japanese destroyed a good deal of equipment in the rubber plantations of the Far East, but had not destroyed too many rubber trees.

Chet Pepper, II, still director of safety at the Watertown Arsenal, said he and Mildred are anticipating grandparenthood in June. Carl Richmond, I, reported increasing business in his work with the Boston Manufacturers Mutual Fire Insurance Company, while O. W. Stewart, I, head of the inspection department of the Factory Mutuals, said he marveled at the new industrial construction now on the books all over the country. Like Roger Loud, O. W. had a son, Pearson, who received an advanced degree — in his case an M.C.P. — at M.I.T. on

September 27. He also told us that in early November, Arthur Baker of Marshfield announced the engagement of his daughter, Jean Sutherland Baker, to Pearson Haslam Stewart, son of Mr. and Mrs. O. Wellington Stewart of Hyde Park.

Ted van Tassel, X, reported that after military duty in the Chemical Warfare Service he is back in consulting work in leather. He recently returned from Toronto, "where classmate Paul Kellogg's live wire organization has lined up several Canadian shoe manufacturers to use either my leather processes or shoe construction methods, and this will require that I spend considerable time in that vicinity." He reported that he had lately acquired two grandchildren. Aleck Yereance, I, still with the mortgage loan department of the Prudential Insurance Company in Boston, reports increased activity as a result of the new state law permitting insurance companies to buy properties for investment. He recently celebrated his 20th anniversary with the company, and he and his wife became grandparents for the first time last June — of a little girl. Don Stevens, II, wrote from Paterson, N.J.: "I wish that I could attend, especially after not coming to the big reunion this year. I very much wanted to meet George Kenney and Luis de Florez. Best wishes to you all, and believe me no honor has ever meant so much to me as to be president of the good Class of 1911." Zeke Williams, XI, Vice-president, also sent regrets from New York City; and from Worcester, Fred Daniels, VI, President of the Riley Stoker Company, wrote as follows: "Fishing is the usual excuse, but this time I shall be in Canada after a deer. This meat shortage is getting me down, and I need some venison for the family."

Ned Hall, II, wrote from Newburyport: "I'm sorry not to be with you, for I had looked forward to seeing the gang after the last four years of absence in the service. I'll be aboard the S.S. *America* on a business trip to the Continent. I'm expecting to capitalize on my year-and-a-half of contacts there while procuring for the Engineers, by importing some of the scarce items that are so hard to get here. I shall be back soon after the first of the year. Best regards to all."

Bog Stevens, IV, was unable to be present, as is his wont, because of an important dinner meeting at the Mount Vernon Church across the Charles River. "Still the struggle between science and religion," opined Morris Omansky, as this card was read by Dennie.

Ralph Sawyer, XII, wrote from Kittery, Maine: "Regret I shan't be able to be with you people. I have improved much during the past six months in facility at walking and climbing on the wooden leg and am beginning to believe that, after all, I may not be confined to office work. Since May, I have been working in Auburn, Maine, for Alonzo J. Harriman, architect, but because of the housing shortage continue to live here in Kittery, getting home only on week ends, a distance of 92 miles. At present I am representing Mr. Harriman on a big building construction job for the New England Telephone and Telegraph Company at Lewiston. I have been on this particular job about four months and expect to be on it for four to six months more. The position seems to be permanent, as a mix-

ture of office work and going out for long periods as inspector and clerk of the works. My mail address remains 68 Love Lane, Kittery, Maine."

Here is the citation which accompanied the award of the Medal for the Advancement of Research for 1946 to Rufe Zimmerman, IX, by the American Society for Metals at its annual meeting on November 21: "From research associate in the former American Sheet and Tin Plate laboratory, he rose through successive responsibilities to the position of vice-president, United States Steel Corporation, in 1933. Here he found the fullest scope for his talents of leadership, since, as staff officer, he acts to co-ordinate the research of a wide variety of the corporation's enterprises in addition to iron and steel technology. In this domain is, particularly, the corporation's research laboratory at Kearny, N.J., the work of which has become famous throughout the world." There's a 1911 man for you!

Plans for erecting a new library building, a new law school, and a modern physical education plant were outlined by Carl S. Ell, XI, president of Northeastern University, at the 48th annual meeting of the University Corporation in Boston on November 7. "The University," Carl said, "is definitely committed to the co-operative plan by day, whereby the students, after their freshman year, alternate regular jobs with pay in business or industry. It also means that Northeastern will continue to emphasize its program of adult education in the evening schools, where the students are employed upon regular full-time jobs in the day and attend classes in the evening." He added that in this 1946-1947 school year at least 60 per cent of the freshmen are veterans and 75 per cent of the upper classmen.

Sellie Seligman, III, New York importer, sent me a clip from a recent New York *World-Telegram* showing a candid shot of George Kenney, II, and Madam Velloso, wife of the Brazilian foreign minister and United Nations delegate, at a recent supper party. "I'll bet you didn't know that George spoke Portuguese," wrote Sellie. "Or maybe an airman, like a sailor, has to learn an international language." Also you can add this item from "The Lyons Den" in the Boston *Herald* to the Kenney saga: "When Bob Hannegan and General Kenney, who was the commander of the Allied Air Forces in the Southwest Pacific, flew over Bikini to see the atomic bomb test last summer, they were in a B-17 bossed by a veteran sergeant. It was the sergeant who helped them on with their Mae Wests and showed them how to use the equipment in case of emergency, and so on. After a perfect, gentle landing, after it was all over, he saluted the four-star General and the cabinet officer and said: 'Anything else, sir?' 'Yes,' said General Kenney, pointing to the plane, 'now take off the saddle and feed her.'"

From the Alumni Office we learn that Carl Barnes, VI, after many years in Geneva, N.Y., is now at 10 La Grange Street, Worcester 8, Mass. It was also fine to learn from the Alumni Fund statement put out on October 31 that 1911 had reached its 100 per cent quota (121 subscribers), but we can't stop there, can we?

Here's a greeting to you all in the hope that 1947 has much of good for you all in the

way of health, prosperity, and fulfillment — Happy New Year, everyone! — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Gardner, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford 55, Mass.

1912

Our 35th reunion comes up next June, and plans are being made; but in order to make it a success, you, yourself, and your friends will have to make an effort to be there.

It is with regret that we have to announce the death of John H. White, II, of West Hartford, Conn., on July 30.

Norman L. Bowen, XII, has been elected president of the Geological Society of America. — Johnnie Noyes, still operating from Dallas, Texas, for the southern division of the Joy Manufacturing Company, became a grandfather last week. Although he feels his age, he states that he will sure be at the reunion come next June. — Hamilton Merrill, Operating Vice-president of Manning, Maxwell and Moore, has promised to have lunch with me when he comes up to open his new plant that has just been built near us in Watertown.

If any of you have a preference as to where we should hold our reunion, do not hesitate to write your Secretary. — FREDERICK J. SHEPARD, JR., *Secretary*, 125 Walnut Street, Watertown 72, Mass.

1913

Whenever I lose anything, I think of an incident which concerns myself and Manuel Hernandez, I. Manuel came to the Institute from Mexico; he was a good scout and operated with notable economy of effort. Over the first term of our junior year, Course I men had 50 problems in physics heat to work, and hand in at the end of the term. Several days before the dead line, Manuel borrowed my solutions, to compare with his, promising to return them the next day. The next day he hadn't finished, and he had this story on every day until the due date. That morning I rushed up to him worried and anxious, whereupon he laughingly said in his deliberate Spanish brogue: "There is something funny about that, [long pause] I l-o-s-t them." I had only time to copy Miles Langley's papers, which were sure to be better than mine. So maybe Manuel did me a good turn.

The point is that I have "lost" for several months the following letters, but I don't think it funny. From Allison P. Smith, VI: "Well, Fred, I can't sell you a farmhouse, a house lot, or something, can I? I'm all through farming. For five years I've been back at my trade as mill carpenter and expect to stay at it. My boys are all over the globe. The youngest is a freshman at Massachusetts State College. Four were in the service; two in the Navy, two in the Army. Don was an Army Air Force gunner and engineer, and was shot down over Yugoslavia, later getting back to the lines, but not until the Secretary of War had sent us his regrets, which turned gray hairs to white. Aside from the worries over the boys, we really have lived well. I had all the gas I needed, and with a new car in 1940, I got along very well. I haven't seen any of the '13 bunch for some time."

From Larry Hart, I: "Our family is at last gathered together again under one single

roof out in Bronxville. Fred is still in the Army but hopes to receive his discharge at an early date. He has been taken off the North Atlantic flights and is now handling priorities and traffic for the Air Transport Command over at Fort Totten, L.I. He and his wife, Claire, are living with us at home because he is permitted to live off post. Bunny's husband, Bob Tompkins, came back from the European theater in July and received his discharge on September 18. They have not been able to find an apartment; so we have Bunny, Bob, and the 14-month old grandson, little Butch, also with us at home."

From Allen Brewer, III: "My latest copy of *The Review* reminded me to hunt for this notice in my 'Unpaid Bills' file. Quite a file. A remarkable place to put things for safe keeping. You see, I didn't lose the notice, just forgot it. I haven't been traveling lately so haven't seen any classmates. Since I became a clam digger and moved to the Jersey shore, I haven't even had a drink with Bob Bonney. Now and then I get to Boston as member of the textile lubrication committee of the American Society of Mechanical Engineers. Maybe I can get to Pawtucket next time. There's no other news. I'm still with Texaco — still editor of *Lubrication* — still able to fish and catch man-size striped bass. The only sign that age is catching up with me is that I hesitate to climb extension ladders to fix a roof or do some painting after hurricanes."

From Alex C. Besosa, X: "Here is my dollar for the Class of 1913. I am sorry to be late, but it could not be done before, as not moderate expenses for keeping the health of wife and myself have recently come to stay with us for a while. You see, I am not among those with an average fair income or salary, as years ago a handicap (I am severely hard of hearing) made me detour from the fine road of fair earning power to a narrow, nasty, dusty, and bumpy one, which I am still following in hopes that it will soon lead me to a highway. However, I am pleased to do this little bit."

From Ira W. Knight, VI: "I am still with the Grinnell Corporation at Providence — as associate director of the division of research and products engineering — a jawbreaking name to cover the company's research and development activities in all its lines of fire protection, industrial power piping, humidification, unit heaters, gray iron, malleable iron and bronze castings, flared type tubing fittings, and so on. I had two boys in service — the older, Richard, who was top sergeant in the Corps of Engineers and saw the battles of Normandy and the German bulge at the Aachen-Remagen Bridge, and so forth, is out and headed back to school; the younger, Kenneth, a second-class radar man for the United States Coast Guard, is still in service, at the Falkner Island Light Station, Conn."

From Wood Selfridge, II: "I am still a crude oiler and still in the right-of-way end of the business. The war effort, particularly, gave me some fascinating and interesting problems. We handled many of the government contracts. It seemed as if every new airport or depot affected Standard's property or pipe lines, each case involving special treatment. The fellows who were working for Uncle Sam did a swell job. Our postwar activities are now rolling in high gear, and we are really busy. As to

family — after spending 14 years in Los Angeles, we moved back to the home office, and home town incidentally, in January, 1937, and have been here ever since. I shall have been with Standard 25 years in January. In May and June, 1944, my wife, daughter Barbara (now 20 years old), and I went East to attend my son's graduation from Annapolis, in the Class of 1945. He is now a junior grade lieutenant in the Navy, and should be at Corpus Christi, having recently finished his primary flight training at the Naval Air Station in Dallas, Texas. He had a year at sea in the Atlantic on the Cruiser *Brooklyn* before beginning his flight training. We all got a tremendous thrill out of the June Week festivities at Annapolis. We had been looking forward to them for three years, and felt we were entitled to them. Barbara is a sophomore at the University of California in Berkeley. On my trip I was able to get a glimpse of Steve Brophy '16, Paolo De Vecchi '15, and Cal Tompkins '15 in New York, and Donald van Deusen and Pete Gaillard '11 in Washington. It's funny, we all agreed we hadn't changed too much — after not having seen one another since graduation day. Thanks, Fred, for stirring me up."

From Hop Hopkins, IV: "I am building a Class II Airport on our farm near Sacramento at Davis, Calif. It is the University Airport. We shall be flying tree- and vine-ripe fruits to you heathen in the far eastern United States as soon as the fruit seasons come along."

From Allison Butts, III: "I have nothing startling to report about myself. I have been at Lehigh all through the war, spending half my time teaching and half directing and working on an Office of Scientific and Research Development-Army Ordnance project, concerning magnetism in nonferrous alloys. My son, Philip, was graduated from Lehigh in 1942 and was at the Sunflower Ordnance Plant in Lawrence, Kansas, during the war. The plant was operated by the Hercules Powder Company, and Philip is now at the Experimental Station of that company in Wilmington, Del. My daughter, Virginia, is a sophomore at Swarthmore College. I hope we shall have a 35th reunion in 1948, and that I shall see you then if not before."

From Ralph Thomas, VI (who has our deepest sympathy in his loss of a fine boy): "I don't believe I have ever written you that my oldest son, Ralph L. Thomas, Jr., was killed in action in the Metz offensive in France on November 16, 1944. He was graduated at the Gilman Country School here in Baltimore in June, 1943, and had been admitted to M.I.T. He was in the ill-fated Army Specialized Training Program, and after basic infantry training was sent to the University of Pennsylvania. When the college program was stopped in March, 1944, Ralph was assigned to the 378th Infantry, 95th Division. He was at the top of his class in math and science, was voted "most likely to succeed," and I believe had a great future. My second son, Gus, 18 last May, is now a first-class seaman in a destroyer at Charleston, S.C. We hope he will be out next summer."

From Ken Franzheim, IV: "It has been a long time since I have heard from any of the old gang, and of course, I want to hurry up and send the dollar before it is too late. I have enjoyed reading the class news off

and on, as I am a regular subscriber to The Review. You have not heard much from Texas because we have all been too busy down here getting "reconverted" to write much. We are designing 10 or 12 large post-war construction projects here, on which an organization of 25 or 30 people are "whooping it up." The only recreation I am getting at present is a retreat I bought in Mexico City last year; that gives me an excuse to go down there off and on. Please remember me to all the crowd."

From Stan Parker, III: "I am still in the steel warehousing business in Chicago. I gave up golf four years ago and took up gardening. — You know what that means!"

Mrs. Bakeman wrote that George, XI, is in Paris, temporarily heading American Relief for France. His address is 20 Rue de la Baume, Paris 8e. Ed Smith, VII, is back in Lima, Ohio, at his old job of superintendent of water and sewage treatment. He was in the service from April, 1943, until June, 1945, during which time, after preparation at Harvard in the Civil Affairs Training School, he served as public works engineer in Africa and Italy, where he covered a great deal of territory. — FREDERICK D. MURDOCK, *Secretary*, Murdock Webbing Company, Box 788, Pawtucket, R.I.

1914

On October 16, Paul Sampson Howes joined that steadily growing list of 1914 men who have attended their last reunion. On the preceding day he had opened a new architectural office in Holyoke, Mass., and appeared to be in fine health. The next morning he had a heart attack and died later in the day. Paul had the unique distinction of being the only member of our Class married to a classmate. On October 21, 1916, he married Constance Fuller, a fellow student in architecture. Those attending the 30th reunion will recall how pleasant it was to have the two Howes with us. They were also present at Alumni Day in Cambridge last June. In spite of being the mother of two daughters and three sons, Mrs. Howes found time to join her late husband in much of his architectural work. Paul was born in Holyoke and transferred to the Institute from Dartmouth College. His entire career has been given to architectural work.

The notices sent out by Charlie Fiske for a class dinner to be held at the Technology Club of New York on December 5 turned up several items of interest. First, we learn with great regret that Bill Simpson met with a very serious accident last May while driving to the station on his way to work. His car was struck from the rear by a car going at a very high rate of speed and driven by an incompetent driver without insurance or apparent means of compensation. Bill suffered leg injuries, and his wife was badly injured and is still under the doctor's care. As Bill had a miniature farm at Mastic, Long Island, he has decided, in view of the accident, to resign from Charles Pfizer and Company, where he has been employed for many years, and to become a real dirt farmer. A speedy recovery to you and Mrs. Simpson and the best of luck to you in your new enterprise.

Palmer St. Clair, who has been chief engineer for Hoffmann-La Roche, Inc.,

manufacturers of pharmaceuticals at Nutley, N.J., has resigned to become staff engineer for the new industrial and chemical division of Ebasco Services, Inc., a subsidiary of the Electric Bond and Share Company. His headquarters are now New York City. — John Sokoloff, who has been with E. R. Squibb and Sons for nearly 30 years, is now assistant to the general superintendent of the New Brunswick laboratories. — Dave Gould has moved across the state of New Jersey and is now living in Leonia, just across from New York City. This move was occasioned by his leaving the Barrett Company to join Decca Records as research director.

Bob Townend has left the Zinsser Company in New York City to become supervisor of inorganic research at the Laurel Hill Research Laboratory (Long Island) of the General Chemical Company. Bob reports that while on a trip to Chicago attending an American Chemical Society convention, he met Dave Gould and Rucker Bristow. Rucker had flown up from Dunedin, Fla., and extends his usual cordial invitation to classmates to come and visit his citrus-fruit-processing establishment there. Now that the years are creeping up, why not hold our next reunion in the winter in Florida and really descend on Rucker en masse?

Roy Parsell writes that he is still the titular head of the patent department of the Winchester Repeating Arms Company at New Haven and that his office door is right on Routes 5, 10, and 15, where he would welcome a visit from any 1914 men passing through. Your Secretary made this stop once and can assure you that a warm welcome will await you. — While driving through Auburn, N.Y., during October, your Secretary stopped in at the Columbian Rope Company and had a fine visit with Jim Reber, who is vice-president of that organization. — After four years in the Army as a lieutenant colonel, of which about three and a half were spent in North Africa and Europe, Welton Snow has returned to Washington and to his former position with the Associated General Contractors of America, which has its headquarters in the Munsey Building.

This summer a luncheon club for Technology men in and around Boston was organized. A special room at Thompson's Spa has been set aside for Technology men. Frank Dunn has taken a very active interest in this group and has telephoned many classmates in the vicinity, inviting them to drop in. There are no dues. Incidentally, Frank's daughter and Ross Dickson's daughter are roommates at Wellesley College. — HAROLD B. RICHMOND, *Secretary*, General Radio Company, 275 Massachusetts Avenue, Cambridge 39, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York 19, N.Y.

1915

Where's that Class Secretary? Barbara, Sam, and Henry are still carrying on for the missing bridegroom. The last report they had was that he was trying to talk his way out of Quebec, where he and Frances went on their wedding trip. He'd get no help from a chap like Wink Howlett who, we understand, hasn't yet passed the entrance exam in French. From a recent report comes the following: "The B. F. Sturtevant

Company division of Westinghouse Electric, with offices at 3001 Walnut Street, Philadelphia, recently announced the appointment of Henry F. Daley as district application engineer. . . . A veteran of 28 years' service with Sturtevant, Mr. Daley held the position as power and marine sales specialist before his newest promotion. His continual career with the company since 1916 was interrupted only during the first World War, when he left in 1917 to serve as a first lieutenant in the Air Service. . . . Mr. Daley is a member of the Engineers Club and Technology Club, both of Philadelphia. He is also a past commander of the Elkins Park, Pa., post of the American Legion."

Jimmie McIntyre has been promoted to the rank of brigadier general. A snappy salute to General Jimmie and congratulations!

In answer to a request Azel sent to Dennie ('11) to look up a freshman friend of his, Dennie wrote: "I went directly from 1946 Freshman Camp, on the last week end in September, to our summer place in Cornish, Maine, for a glorious vacation during the first two weeks of October, hence the delay in writing you to tell how pleased I was to have young John J. Mohr make himself known to me as a friend of yours. . . . He seemed to enjoy himself immensely at camp, and I think it's great for these kids now to enter the Institute knowing a number of classmates. Contrast that with our "cold" climbing of Rogers' steps knowing practically no one on Registration Day! . . . I hope to see you regularly at council meetings this season."

There should have been more "Dennies" in our day. He does a grand job for these youngsters. In the September issue of *Textron Tide*, the house organ of Textron, Inc., is a fine picture of Reggie Foster, good-looking and all smiles, being presented a check for the Lowell Boys Club, of which Reggie is president. This is a noble work Reggie is doing in helping these boys.

In the New Haven, Conn., *Journal-Courier*, the announcement was made by Mrs. William N. Hubbell of that city and of Quincy, N.H., of the engagement of her daughter, Helen Jackson Hubbell, to Philip Langon Alger of Schenectady, N.Y., son of Mrs. Philip R. Alger of Annapolis, Md., and the late Captain Philip R. Alger, U.S.N. Miss Hubbell's father was the late Rev. William N. Hubbell of New York. An associate professor of chemistry and nutrition in the Yale School of Nursing, Miss Hubbell was graduated from Teachers' College, Columbia University, in 1917. She received her M.S. degree in 1928 and her Ph.D. degree in 1936, both from Columbia. During the years 1928-1931, she was extension assistant professor of home economics in the New York State College of Home Economics, at Cornell University. Mr. Alger is staff assistant to the manager of engineering in the apparatus department of the General Electric Company, and a director of the American Institute of Electrical Engineers. He was graduated from St. John's College, Annapolis, Md., in 1912 and from Technology in 1915. He received an M.S. degree from Union College in 1929. From 1917 to 1919, Mr. Alger served as lieutenant in the Ordnance Department, and later was a major in the

Reserve. The wedding was to take place on November 9 in the home of Miss Hubbell's sister-in-law, Mrs. William Bradford Hubbell in Bedford Village, N.Y. To Phil and Mrs. Alger go the congratulations and hearty wishes of the Class of 1915 for a long, happy, and successful life together.

Until we locate that bridegroom Secretary, we've got to keep good old 1915 going. Azel always seems to remind you of the Alumni Fund checks. If you haven't sent yours in, do so at once, so that we can "help Azel." A successful and joyful 1947 to you all and help us get Azel back on this job! — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline 46, Mass.

1916

Among those who were in the higher echelons during the war is Walter Boatwright, whose brief history follows: "In 1916 I returned to duty at the Coast Artillery School, Fort Monroe, Virginia, and during 1917 had the pleasure of instructing many of my former instructors at M.I.T. in the intricate details of ballistics and gunnery. Later, I served in France with the 30th Artillery Brigade and on the staff of the Chief of Artillery, of the American Expeditionary Forces. After World War I, I spent four years on the staff of the Chief of Coast Artillery and was then transferred to the Ordnance Department. During the years of peace, I served at various manufacturing arsenals in the United States and with troops in our possessions. I commanded Frankford Arsenal in Philadelphia, Pa., our largest manufacturing arsenal with a peak employment of 20,000 people from 1938 to 1942, and then moved on to Detroit, where until V-J Day, I commanded the office of the Chief of Ordnance-Detroit, charged with design, procurement, storage, and maintenance of all tanks and automotive equipment used by the Army. I was awarded the Purple Heart in 1918, and the Legion of Merit and Distinguished Service Medal in 1945. I was promoted through the grades to lieutenant colonel during World War I and reverted to my permanent grade of major in 1920. In 1937, I was promoted to the grade of colonel and to that of brigadier general in 1940. On February 28, 1946, I retired, after 38 years of active service, and am now vice-president of Globe Wireless, Ltd.

Bill Liddell's class history notes include these paragraphs: "Seventeen of my 30 years as an alumnus of the Institute were devoted to teaching on the staff of the Institute's Civil Engineering Department, with hydraulics, water power, and stream gauging claiming the chief part of my attention. Since leaving the teaching field, my activities have been largely in the service of the Federal Government. My first connection was as a hydraulic engineer with the New England regional office of the National Resources Planning Committee, at Boston, engaged in supervising and coordinating hydrologic surveys. In the spring of 1938, I joined the engineering staff of the Federal Power Commission and have been with this agency since that time. My first year was spent in the commission's New York regional office. Coming to Washington in May, 1939, I joined the then recently organized power-flood control division and have been engaged on river basin planning since that time, except for three

years when I was in Atlanta administering the affairs of the commission in the Southeast. My present stay in Washington dates from the fall of 1944. My three years in the South gave me an insight into the delightful ways of southern living, and although my first few spoken words were always enough to raise suspicions reserved by Southerners for 'damn Yankees,' I managed to make and retain many friendships among native-born Southerners. A six-month stay in California was among my experiences since joining the commission, and, short though it was, it was enough to make me understand why Californians suffer no inhibitions about the grandeur of their native state. This may smack of heresy to my New England compatriots, but one can't roam about this country of ours without discovering that every area has its own charm and its quota of fine people."

And from the class history notes of Al Lieber, a colonel on the General Staff Corps (Corps of Engineers), we have the following excerpt: "Immediately before this war started, I was involved in the development and construction of the air bases from Newfoundland to Guiana; and as the war broke, I was loading up an expedition to go to Iraq and Iran to build piers and roads to get lend-lease supplies up from the Persian Gulf to Russia. I returned in September, 1942, and after a brief hospital sojourn to rid myself of old bacilli and gain weight, joined the Headquarters-XII Corps as engineer. Subsequently, I was assistant chief of staff, G-3, and deputy chief of staff in the United Kingdom, France, Luxembourg, and Germany. We got into action directly after the Avranches break-through, and wound up in Bavaria and Czechoslovakia, by way of the long gallop leading off for Patton across France and into the Saar, then up into the south corner of the Bulge, through the Siegfried Line and to the Rhine, and finally across the Rhine and on through Germany, by way of the many changes of direction that marked Patton's operations. In late April, 1945, I went to the XXIII Corps as chief of staff and helped organize the occupation and government forces in the Rheingau, Palatinate, and Saar; later we turned the area over to the French and moved across the river to repeat the process in Baden and Hesse. In the summer I shifted to the XXI Corps in Württemberg, and when the Corps was demobilized in the fall joined the Theater General Board to write all about it. I flew home just in time for Christmas with the family, the happiest I have ever had. It was an active life in stirring times. One thing I shall never forget is the fortitude and heroism of the combat soldier, the doughboy and the tanker particularly, but also those that back them up. I wish we could do our current jobs as well as they did theirs."

Some of the paragraphs of Al Pettee's history will interest many: "From 1941 to 1943, as the country prepared itself for war, there was enough cable engineering going on to keep me busy in Chicago as district engineer for the General Cable Corporation. In 1943, this activity diminished to such a degree, and our manufacturing operations on wire and cable for the Army and Navy expanded so prodigiously, that my company found it desirable to transfer me to its Bayonne, N.J., plant, where tremendous quantities of shipboard and power

cable were being made. As technical superintendent from 1943 to 1945, I had the good fortune of being able to put my whole weight into the war effort. Besides helping push through the sheer bulk of war material, I also had the privilege of being responsible for the technical features of producing the three-inch lead pipe which formed an integral part of the 35-mile length of armored submarine gasoline pipe which our company made for 'Operation PLUTO.' This was the pipe-line operation across the English Channel which contributed so heavily to the Allied victory in Europe. In 1945, as the war clouds began to scatter, I was transferred to our sales engineering department as assistant chief engineer, and in early 1946 was made chief engineer, with headquarters at New York. Earlier, in previous reports, I must have mentioned a wife and three children. All are well and thriving, with the possible exception of my older son, Daniel, who came home from France in March, 1945, with the Bronze Star and a shattered lower leg. This is in the process of being reconstructed, and if it goes well, he expects to be walking normally again in about a year. My daughter, Barbara, was graduated from Smith in 1944 *cum laude* and is now an 'independent economic unit' in New York. The younger son, James, to be graduated this year from high school, will go to Colgate at such time as the Army and Navy permit."

In May, George Steese sent this information to the Class historian: "Although I was unable to accept, it was nice to have a general in the Army War College ask me for my services in this war. That seems to tell my whole story. I seem to remember Mr. Barker always calling on Mr. Binger for the answers! I'm sure you still have them; I know less and less what life is all about. As for hobbies, we shall always love dogs. We like to travel by automobile in Mexico and in Western Canada. We cannot drink any more!"

Perhaps all have not known of the rise of one of our most distinguished classmates, Bob Wilson, who moved back to Chicago in 1945. Throughout the war, he was a member of the Petroleum Industry War Council, where he was chairman of the committee on petroleum economics and the technical committee. On January 1, 1945, he was made chairman and chief executive of the Standard Oil Company (Indiana) and subsidiaries. This company is the dominant refiner and marketer in the Middle West and also controls the Pan American Petroleum and Transport Company, the American Oil Company, and other subsidiaries which market in the East.

Jack Camp is still enthralled with flying. He writes: "There is nothing really difficult about it, for if there had been you know I would never have gotten a license and the fact that I got it in 18 days shows that it must be pretty easy. It is true that I did nothing else during those 18 days, and I worked very hard, but it was exactly that length of time from my first lesson till I passed my flight test."

Steve Berke evidently fell in love with Cape Cod; we hear he is building a bridge at Osterville. From Market Forge in Everett, Mass., came a call from Nat Warshaw reporting himself to be in good health.

Steve Whitney dropped in recently while commuting from Watertown to Winni-

pesaukee and vice versa. He, unlike Nat, was not in good health at the moment, but we trust that he has improved since then.

R. H. Mills writes: "Our Assistant Secretary requested 'a couple of paragraphs' from me to bring my status up to date, and I will try to do so. I am still with the Bell Telephone Laboratories. For a number of years I have had charge of an engineering group which has been responsible for the development of electrical filters for use in voice and carrier frequency communication systems. My family consists of my wife and a son and two daughters. My son, who is now 21, took the V-12 Navy course in mechanical and aeronautical engineering at Cornell and obtained his commission as an ensign. He has returned to Cornell for further study. The two girls, ages 19 and 18, are respectively at Stephens Junior College and Green Mountain Junior College. Another important member of my family is our old dog Pal, aged about 14. He is the only one of the family who lives at home with the 'old folks,' not being of college material and too old for such consideration anyhow. Our pleasures in life consist mostly of extended motor trips, browsing around in the near-by country, hiking and mountain climbing, canoe trips and camping, of which the whole family, again including the dog, is fond. Also my interest in color photography keeps me out of mischief in my spare time." — RALPH A. FLETCHER, Secretary, P. O. Box 71, West Chelmsford, Mass. HAROLD F. DODGE, Assistant Secretary, Bell Telephone Laboratories, 463 West Street, New York 14, N.Y.

1917

Jim Flaherty, who was formerly on the staff of Stone and Webster, as an architect, has now established his own office. He is chiefly engaged in industrial and ecclesiastical work and has recently completed plans for the addition to the Cambridge Hospital and for the Bethlehem steel mill at Hingham, Mass. — Phil Cristal's daughter is now employed in the Boston office of Keystone Custodian Funds, Inc. She was formerly on the staff of the Beaver Country Day School in Brookline.

John DeBell is now in England and has taken Mrs. DeBell with him on a combined business and vacation trip. This is his second postwar plastics investigational trip across the Atlantic. It will be recalled that as a result of the first, he prepared an outstanding report of German plastics developments that was of interest to all workers in the field. John's 18-year-old daughter was married shortly before his present trip across the ocean.

As these notes are being written, plans are under way in the Boston area to celebrate Lobby's recent election as executive vice-president of the Alumni Association, by a dinner for him at the Hotel Lenox on Thursday, November 21. A report of the proceedings will no doubt be forthcoming in next month's notes. — As of mid-October, Lin Noyes was in Tucson, Ariz., for two months or so of rest and relaxation. His daughter, Margery, was married in June to J. R. Reed of Milwaukee, Wisc. — RAYMOND STEVENS, Secretary, 30 Memorial Drive, Cambridge 42, Mass. PHILIP E. HULBURD, Assistant Secretary, Phillips Exeter Academy, Exeter, N.H.

1918

The business of dispossessing tyrants is mainly disagreeable, but there are some aspects of it which are not altogether saddening to the spirit. Thus, Brockton, from which Frank Creedon came to M.I.T., has been diligently revising its legends about him since 45 generals looked on in Washington while Secretary of War Patterson pinned the Medal for Merit (highest civilian award) on the left lapel of his best blue suit just two inches above and to the left of where the tip of a white handkerchief peeked out of his breast pocket in order to witness the occasion. The following citation, signed by President Truman, was made in recognition of Creedon's achievements as project manager for the Stone and Webster Engineering Corporation in building the atomic bomb plant at Oak Ridge, Tenn.: "Frank R. Creedon, for exceptionally meritorious conduct in the performance of outstanding service to the War Department, in brilliant accomplishments involving great responsibility and technical construction ability in connection with the development of the greatest military weapon of all time, the atomic bomb. As project manager directing construction of one of the largest and most vital plants for the production of material for use on this project during a crucial stage of the program, between 1944 and 1945, his driving force and energy, his technical experience and skill, his diplomatic handling of difficult situations, and his unswerving devotion to duty contributed immeasurably to the attainment of the objective. Mr. Creedon's accomplishments reflect great credit upon himself and upon the military service."

Earlier in the war period, Mr. Creedon served with the Construction division in handling contracts for ordnance plants throughout the country. He has just been appointed to the War Assets Administration, where he will direct the disposal of surplus construction and other heavy equipment as director of the capital and producers goods disposal.

A little legend revising is in order concerning Walter Biggar, who also started out as a civil engineer, but somehow, perhaps in an effort to appear utterly uninterested in foundations, dams, bridges, railroads, tunnels, aqueducts, highways, or exact measurements along the earth's surface, became a Fuller Brush man. No, not the man who rings your doorbell, but the man who recruits and trains and supervises the man who rings your doorbell. He was the man behind the man — but right there is where the legend needs to be revised, for during the war Walter put in four years as an army instructor in Coast Artillery.

"It's the first time," he says, "I opened a log table or thought of a trigonometric function since I was graduated. It all came in handy, though, after a lapse of almost a quarter century of relative calm." After spooning out sines and cotangents for four years, Walter is back with his wife and two daughters, imperturbably running the Springfield office for Fuller Brush. It all goes to show you never can tell when what will come in handy. — GRETCHEN A. PALMER, Secretary, The Thomas School, The Wilson Road, Rowayton, Conn.

1919

Oscar A. de Lima was released from the Naval Hospital, Bethesda, Md., early this year, after completion of his duty as war plans officer, and commander of minecraft, in the United States Pacific Fleet, and shortly afterward was released to inactive duty. He returned to prior civilian activities, including presidency of the Roger Smith Hotels Corporation. As Department of State consultant, he executed three missions abroad for the Caribbean Commission, and served as chairman of conference of Caribbean governments, which initiated a program for creating a Caribbean Tourist Development Association in New York. He adopted a baby girl, Suzanne, and lives at High Ridge, Stamford, Conn.

Ed Deacon, President of the Climax Engineering Company in Clinton, Iowa, writes as follows: "There isn't much to report from this part of the country except that I am a farmer as well as a manufacturer now and raise white-faced cattle and Iowa hogs. There is nothing to equal it as a retreat from all the problems of reconversion and the ills of this world. My son, Ted, is still flying in Europe, and my daughter, Betty, is with her husband at West Point. He is a lieutenant colonel now, and after three years of bitter fighting in Europe, was assigned to the teaching staff at the military Academy."

Jacob M. Carter writes from West Monroe, La., where he is with the Nehi Bottling Company: "There is no news of interest down here, and I have not seen a classmate in 27 years. There is so much oil and gas development in my area that the deer and bear are getting crowded out. With all the industrial development down here, I should see a Tech man occasionally (even if he is lost)."

Leo E. Beaulieu of 225 Walnut Street, Holyoke, Mass., writes: "I am still the owner and operator of an electrical appliance store and an electrical contracting company — otherwise no change."

Bernard S. Coleman has moved to Los Angeles, where he has just been appointed associate executive director of the Los Angeles Sanatorium at 208 West 8th Street. The Rocky Mountain Technology Club recently elected Bernard vice-president. He has two sons, Roger and Kenneth, who are freshmen at the University of Colorado.

Daniel N. Crowley, Jr., President of Almy, Bigelow and Washburn, Inc., has opened a new junior department store in Danvers, Mass., and the Danvers *Herald* on October 17 carried a detailed story. Crowley is president of the Salem Chamber of Commerce, director of the Salem Hospital, an active Rotarian, and associated with many civic and business projects of the Essex County area.

The following changes of address have been received: Elisabeth Coit now resides at 1744 Riggs Place, Northwest, Washington, D. C. Laurence A. Gillett has moved from New York City, and the address we have for him is Virginian Railway Company, Terminal Building, Norfolk 10, Va. Captain Frederick R. Hewes has moved from Corpus Christi, Texas, to 190 Sherrin Street, Hyde Park 36, Mass. Edward M. Sherman has moved from Wellesley, Mass.,

to Canton, Maine, Box 295. — EUGEN R. SMOLEY, *Secretary*, The Lummus Company, 420 Lexington Avenue, New York, N.Y. ALAN G. RICHARDS, *Assistant Secretary*, Dewey and Almy Company, 62 Whittemore Avenue, Cambridge 40, Mass.

1921

For you and yours we wish an even greater measure of happiness and success in the New Year.

Curtiss T. Gardner is our newest literary luminary to be distinguished as the author of a book. Published by Mill in the Mill Circle Mystery series and available at all bookstores at \$2.00, according to the New York *Herald Tribune* book section, *Bones Don't Lie* is illustrated in that estimable journal with snake eyes of the cubist's parlance and described by means of the customary blurb which, in this instance reads: "Through the flaming shadows of the steel mill, a murderer walked — following the man, Ray Locke. But Ray was hunter as well as hunted — and General Ulysses Grant Flint knew guilt as a hound knows blood." Curt evidently knows the novelist's art better than most general sales service managers, which latter responsibility was his at the Liberty Mutual Insurance Company in Baltimore a little over two years ago. Now residing in Tice, Fla., just outside of Fort Myers, Curt is devoting all his time to free lance writing, mainly for the pulp mystery and detective magazines, which have already printed several of his stories. He is married and has two children, Nancy, who is 18 and Curtiss T., Jr., now almost four.

David O. Woodbury, the dean of our corps of writing experts, is so consistently in print in some field somewhere that the sun probably never sets on the works of the one-time exponent of the Goopapa misinformation series. Dave has paused in his labors as editor of the regular "Your Life Tomorrow" column in *Collier's* long enough to add two recent books and one article to his long list of published material. We have had to develop the habit of examining all printed matter, from juvenile to learned levels, for the Woodbury by-line because His Royal Modesty is not given to letter writing about his accomplishments. Let it be said that he did reply to our inquiry about his book devoted to the construction of the Pacific Naval Air Bases, *Builders For Battle*, a 415-page running account, published by E. P. Dutton and Company at \$7.50 and illustrated with some 75 pencil and pen and ink sketches, which supplement the vivid narrative. Dave says, in part: "The contractors bought a whole edition, 6,000 copies, and sent them far and wide to executives from President Truman on down. Reactions are uniformly splendid. It may make me famous." He has also completed the large volume of its war history which he contracted to do for Westinghouse, and it is being distributed. While we are admiring "Facts and Fancies," an article he wrote for *Boys' Life*, published by the Boy Scouts of America, Dave continues with the following: "I am contemplating doing something on atomic power, showing that the scientists really didn't bring the project off single-handed, as the press has suggested. This work would include about 25 companies and be hopelessly entangled

with security regulations and other difficulties. Oh, well, I asked for it when I abandoned engineering for typewriting!"

The announcement that the Rangeley Lake Hotel in Maine has become the 25th hotel property in the rapidly growing Sheraton chain, calls attention to the two publicity-shy members of the Class who have principal parts in the huge Boston financial empire, Ernest Henderson, Jr., and Robert L. Moore. It all started after the last war when Ernie and his brother George, respectively in the Naval Air Force and a captain of infantry, picked up items in Europe at the war's end which were scarce in this country and then formed Henderson Brothers, importers, to merchandise everything from cameras to police dogs. From importing, they went into the radio business and built a string of New England outlets known as the "World Radio Stores." Bob Moore, who had been a first lieutenant in the Army Air Service and won the Croix de Guerre with palm in World War I, had caught the same fever at the close of hostilities and joined the Hendersons after serving as assistant to the president of E. A. Filene Sons Company. Dropping the radio business, the trio acquired a number of investment trusts and, after the 1929 stock market crash, they bought up control of the Copley Plaza. Now known as the Sheraton Corporation, they have added to their early holdings a large number of hotels in cities extending from New England to the Middle West and to Florida. Apartment houses and business buildings have also been acquired, notably the Park Square Building, and early last year the famous Thompson's Spa system was added to swell the holdings to some 40-odd properties.

Robert R. Neyland, brigadier general in command of the Army Service Forces in Calcutta and one-time United States District Engineer for the Southwestern Division, is reported to be back at his home in Tennessee, making football history again as the head coach of the University of Tennessee eleven. He has been identified with the Vols for 15 years. John L. Boston is engaged in new construction work for the Boston Consolidated Gas Company. The Malcolm B. Lees family (Cornelia Nelson) spent an extended vacation out West and have returned to their new home in Ridgewood, N.J., at 180 Godwin Avenue.

Francisco L. Lazo is technical secretary of the department of civil aeronautics of the Secretariat of Communications and Public Works of the Mexican Government, Mexico City. Christopher C. Carven is chief architect with Parsons, Brinkerhoff, Hogan and Macdonald, 75 Fulton Street, New York, N.Y. Charles A. Williams, Vice-president of the United Illuminating Company, New Haven, Conn., writes that his son Billy is now in the Navy and daughter Molly is attending school in New York. Charlie is president of the New Haven Chamber of Commerce.

Augustus B. Kinzel, Vice-president of the Union Carbide and Carbon Research Laboratories, Inc., and the Electro Metallurgical Company, has been signally honored in being re-elected chairman of the Engineering Foundation. Gus, who was recently made a director of the American

Institute of Mining and Metallurgical Engineers, will represent the Engineering Foundation on the executive board of the National Research Council. Thomas F. Murphy was nominated by President Truman as assistant commissioner of patents. Tom has been associated with the Patent Office for many years and makes his home in Washington, D.C. He is married and has two daughters.

Albert L. Edson has been named manager of the Bedford, Mass., airport. Formerly director of the East Boston airport, until he joined the Army Air Forces in 1940, Al served as commanding officer at airfields in Khartoum, Gander, and Steventown with the rank of colonel during the recent war. He originally trained for flying at various fields in the South and was connected with the Dennison Airport Corporation at North Quincy, Mass., in the late 1920's. He was a member of the air service division of the Massachusetts National Guard and was its supply officer, with the rank of captain, when he was given charge of the Boston airport.

Mr. and Mrs. Dwight S. Brigham of Newton Center, Mass., have announced the marriage of their daughter, Mary Stillman Brigham, to Benjamin Fisher, son of Mrs. Benjamin Fisher of Dedham, Mass., on October 12. Ben is assistant secretary of the Kendall Company in Walpole. His bride is a graduate of Vassar and a member of the Junior League. They will make their home in Dedham.

Add these new addresses to your directory of the Class: Ralph R. Evans, X, 47 Youle Street, Melrose 76, Mass.; Robert M. Felsenthal, X, 440 Beechmont Road, New Rochelle, N.Y.; Commander Thomas H. Frost, X, Bureau of Ships, United States Navy, Washington 25, D.C.; Colonel John R. Hardin, I, Mississippi River Commission, Vicksburg, Miss.; Paul B. Hunter, II, 136 Hillside Avenue, Metuchen, N.J.; Henry R. Kurth, VI, Boston Edison Company, 39 Boylston Street, Boston 12, Mass.; Samuel E. Lunden, IV, 2927 Via La Selva, Palos Verdes Estates, Calif.; Richard McKay, XV, 3237 Gunston Road, Alexandria, Va.; Captain Herbert W. Reinhard, XV, 257 Cabot Street, Newtonville 60, Mass.; Charles W. Richards, X, International Paper Company, Southern Kraft Division, York Haven, Pa.; Herman B. Thompson, I, 674 North 59th Street, Omaha 3, Nebr.; Brigadier General Ludon D. Worsham, I, United States Corps of Engineers, Western Ocean Division, Sausalito, Calif.

If you haven't written to your Secretary recently, add another resolution to do a good turn and start a letter right now. — CAROLE A. CLARKE, *Secretary*, International Standard Electric Corporation, 67 Broad Street, New York 4, N.Y.

1922

Our 25-year reunion is the most important thing on our docket. Alumni Day in 1947 has been set for June 14, and our reunion will be held on that week end. Now is your last opportunity to take a tax reduction in 1946 on your contribution to the 25-year class gift. Make your check payable to the Institute and mark it for the 1922 gift fund.

Our Class is well represented in Institute and Alumni affairs. George Dandrow is vice-president of the Alumni Association;

Linsley, Carpenter, McCurdy, Blackall, and Browning are term members of the Corporation. Members of various committees are as follows: Dandrow and Warren Ferguson on that to promote increased activities of the Alumni Council; Appel and Tonon, that to nominate representatives of the local associations; Dandrow and Chittick, on the Council of the Alumni Association. Teeter, Shepherd, Appel, Wildes, and Eacker are representatives of local associations and clubs with Russell and Tonon as alternates; Mueser, Heavey, and Hodgins are on Visiting Committees; Dandrow, on the Alumni Fund Board. Seven members of our Class are officers of local alumni associations and clubs, and 22 members of the Class are honorary secretaries.

John Bower, general manager of the Texas Petroleum Company, in Bogotá, Colombia, was in this country last summer for a vacation, and we hope he will be back in June for the reunion. — Don't fail to read Eric Hodgins' new book, "Mr. Blanding Builds His Castle," which will be published by Simon and Schuster in January. This is a Book-of-the-Month Club dual selection and is an expansion of his autobiographical saga, which was first printed in *Fortune* and reprinted in *Life*, the *Architectural Forum*, and the *Reader's Digest*. Eric has relinquished his position as vice-president of Time, Inc., to return to the *Fortune* staff. — CLAYTON D. GROVER, *Secretary*, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York 14, N.Y. WHITWORTH FERGUSON, *Assistant Secretary*, 333 Ellicott Street, Buffalo 3, N.Y.

1923

There is only one item to report this month. James E. Brackett has been appointed class agent for the Alumni Fund in place of Bob Shaw. Jim is with the industrial engineering department of Chance Vought Aircraft Corporation, at Stratford, Conn. We wish you all the compliments of the season. — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree 84, Mass. HOWARD F. RUSSELL, *Assistant Secretary*, Improved Risk Mutuals, 60 John Street, New York 7, N.Y.

1924

A recent letter from Chick Kane contains several items of interest. He says: "First, George Parker (of George E. Parker and Company, management consultants, Worcester) has been busy as usual — in his own words: 'I have been up to my ears in business, spending my work-week in Worcester and shuffling home to Newburyport to be with my family on week ends. Also, Madeline recently presented our third baby daughter, and I naturally had to have a few days off for that event.'"

"Then (I should have written you about this before) Nish Cornish journeyed up from Mexico City to enter his oldest boy, C. M., Jr., in the Institute this fall. He spent the night with the Kanes in Lincoln, and we learned in detail that M.C. is God's country, and that we should hold our 25th reunion there — or at least a reasonable facsimile thereof. I had lunch with him one day at the Tech clubroom in Thompson's Spa. Nip Marsh, Peggy Joyce, and Fred Ashworth were there, and Freddy

Westman wanted to come but was in Baltimore entering his daughter in Goucher at the time. Freddy has his own architectural offices in Boston now, on Water Street.

"I had a rather interesting experience myself recently, when I got in on one of these Good Will tours the Navy has dreamed up. I went down to Guantanamo, Cuba, boarded the U.S.S. *Leyte*, a brand new carrier, and went to sea in her for four days, then had three more days at the base, tarpon fishing and such like. The Navy flew us both ways, making quite a trip.

"I've asked Frank Shaw to turn out another Class Agent letter for mailing this month, and to include in it a request for information for class notes, and a return form. This has worked exceedingly well in other classes, and should provide enough material for months ahead. We'll see."

Chick must have had a busy summer, what with his Alumni Fund and administrative duties at the Institute and the publication of his sixth book in the "Wild World Tales" series. The "Wild" refers to the subhuman level of animals, we believe.

Congratulations are in order for Perry Maynard who — as commanding officer of the War Department Signal Center — has been awarded the Legion of Merit for "outstanding contributions in the development of means for transmitting throughout the world unprecedented volumes of military and war-related messages." Colonel Maynard is now back at his post with the American Telephone and Telegraph Company in New York.

Nip Marsh, who is associated with the Home Insurance Company in Boston, has been appointed to represent the Class in the Alumni Council, and will also be one of the group making preliminary plans for the big reunion in 1949.

Bill Correale is still on the taxpayers' payroll, namely the United States Army, but is now stationed in New York, with the Assistant Engineers Office of New York Harbor. Bill is spending his spare time and evenings at the Murray Hill Hotel, at least until they tear it down to make way for a new skyscraper.

Greg Shea has taken on a job which may prove helpful to numerous Technology Alumni in the New York area, as well as the entire state. He has become director of the New York County chapter of the New York State Society of Professional Engineers. It is therefore suggested that any of you seeking to pass this exam get acquainted with Greg, so that when the time comes for you to secure the necessary endorsements, he will know something about you and your qualifications.

Henry Zeiger is receiving condolences on the outcome of his recent race for membership in the New York State Legislature. Rumor hath it that the only thing wrong with Henry's campaign was that he picked the wrong horse in the right race and came in about 10 years too late for the win.

Recent address changes indicate that John Buckler has moved from Bexley, Ohio, to Ypsilanti, Mich.; Doc Hancock from Louisville, Ky., to Jeffersonville, Ind.; Jack Liecty from New York to Phoenix, Ariz.; Dan Officer from Silver

Spring, Md., to Hingham, Mass.; Charlie Reed from Metuchen, N.J., to Huntingdon, Pa.; and George Salsman from California to Bourne, Mass. — FRANCIS A. BARRETT, *General Secretary*, 234 Washington Street, Providence, R.I. WILLIAM W. QUARLES, *Assistant Secretary*, 330 West 42nd Street, New York 18, N.Y.

1926

The Secretary had an unprecedented opportunity in November to visit members of the Class in various parts of the country, and he enjoyed the experience very much. He was particularly impressed by the extent to which class members have progressed since graduation and carved out important places for themselves in their communities.

In Chicago at a meeting of the Technology Club, there was a whole table of '26 men present, including Bruce Humphreville, Ted Mangelsdorf, John Wills, and Jim Offutt. Several days later the Secretary had lunch with Ted Mangelsdorf and his wife. Ted, who brought his son to the Technology Club dinner, is with the Texas Company at their refinery at Lockport, Ill.

In San Francisco, Bill MacQuarrie has been president of the M.I.T. Club of Northern California for a period that almost competes with Mr. Roosevelt's term of service, except that Bill has finally decided to retire. He is with the Exide battery company. Another '26 man in San Francisco is Lewis Clark.

In Los Angeles, Helmut W. Geyer presided at the meeting of Technology Alumni there and also took the greater portion of one day out of his busy program to take the Secretary sight-seeing. He is utilization engineer for the Southern Counties Gas Company. Helmut has come to know the southern California area very thoroughly, and the Secretary consequently got an extraordinarily good introduction to the city. It was a great pleasure to see him for the first time since graduation.

In Houston, the Secretary met Donald King, who is with the Carbide and Carbon Chemicals Corporation at Texas City, and Joseph Casey, who is with the Humble Oil and Refining Company at Baytown. In Birmingham, Alden Peterson, one of the six noted Petersons in our Class, was present at the meeting of the Southeastern M.I.T. Association. Alden is president of the Roofing and Maintenance Company in Birmingham. Finally, in Charleston, W. Va. the Secretary saw Irvin L. Murray, also of Carbide and Carbon. Early in the war Irvin went to Russia as a member of the United States rubber mission.

Eben Haskell's program to build our class endowment fund up to \$100,000 at the time of our 25th reunion is steadily gaining headway. The exceedingly generous responses which are now in are setting the pace for the many more pledges and contributions which we must obtain in order to meet the goal. Eben has given an extraordinary amount of time and careful planning to our class fund. He is making a major contribution to the Institute and to the Class through these efforts.

Hump and Jane Barry have announced the birth of a son, Edmund, on November 5. — Professor Locke '96 calls attention to a recent publication by Ariel F. Horle in the *Engineering and Mining Journal*, entitled,

"New Yardstick for Gaging a Drill's Economic Life." — The Secretary spoke of seeing Bruce Humphreville in Chicago. A recent release from the Johns-Manville Corporation reports that Bruce has resumed his duties as engineer with the company in Chicago after discharge from military service. The release further reports that "Mr. Humphreville, presently employed by Johns-Manville's Celite division as sales engineer for filter aids and fillers used in the processing industries, came with the company in 1931 after graduation from M.I.T. and previous employment with firms including the Fisk Rubber Company in Massachusetts, the Barrett Company in New York, and the Merck Chemical Company in Rahway, N.J. He was called to active duty as an Army reserve officer in 1941, serving with the Chemical Warfare Service in this country and 31 months overseas in Europe and Africa. Mr. Humphreville received the A.D.S.M. medal, the Africa E.T.O. service ribbon with six campaign stars and bronze arrowhead, the Bronze Star, the American Theatre ribbon, and the Victory service ribbon. He was made a member of the Chemical Warfare Board upon his return to this country and was released from active duty as a colonel, Chemical Warfare Service, in January, 1946."

Through the efforts of George Warren Smith, the members of the Class in the Boston area are coming together at luncheon each Monday as a part of the program of the M.I.T. Luncheon Club at Thompson's Spa on Washington Street. The time schedule is between twelve and two, no attempt being made to specify a definite hour for the '26 group.

The Register of Former Students reports that Norman Hill has moved from Pittsburgh to Akron, Ohio; that Malcolm Hird, formerly with American Cyanamid in Wallingford, Conn., is now with the Waldrich Company in Delawanna, N.J.; that John Bird is with the Worthington Pump and Machinery Corporation in Harrison, N.J.; and that Stanley Thomson is with John Underwood and Company in Toronto. — JAMES R. KILLIAN, JR., *General Secretary*, Room 3-208, M.I.T., Cambridge 39, Mass.

1927

Your Class Secretary is at present in Cairo attending a meeting of the International Air Transport Association and once again we are trying to substitute for him. The news is practically nil; but we can report the military record of Dick O'Donovan, who entered active duty as a lieutenant, U.S.N.R., on May 15, 1943, at the Naval Construction Training Center, Camp Perry, Virginia. After the usual training, he was assigned to 108 Naval Construction Battalion in July, 1943, with the duties of company commander and utilities officer. In February, 1944, he was assigned as officer in charge of Construction Battalion Maintenance Unit 586 and shipped to Torokina, Bougainville, Solomon Islands. At this base he was given the duties of all maintenance extensions and improvements to roads, airfields, naval base and hospital structures, water and electrical utilities, and transportation operation and maintenance. After six months he was given additional duties as public works officer, Staff Representative of Com-

mand Naval Base on all construction projects. In March, 1945, he was designated as public works officer of the naval facilities in the Northern Solomon Islands, coordinating construction of various bases, lend-lease transactions, and repair or forward shipping of available equipment.

Upon the inactivation of these bases, Dick proceeded with his unit to Samar in the Philippines, where the original unit was inactivated. Duty was assigned him as officer in charge 75 Naval Construction Battalion Maintenance Detachment, charged with the maintenance of the Naval Air Station at Leyte. He returned to this country on November 12, 1945, and was to go on inactive duty on January 23, 1946. His home address is 624 Alcazar Avenue, Coral Gables, Fla. — JOSEPH S. HARRIS, *General Secretary*, Shell Oil Company, Inc., 50 West 50th Street, New York 20, N.Y.

1929

Greetings from the past to all of you for the Christmas and New Year, after a long dearth of information regarding the activities of classmates. A letter from John Dreyer, who is out in the Cincinnati area engaged in the manufacture of Polaroid equipment, reminded me of my responsibilities and after waiting for another month to see whether any of the rest of the Class would get on the ball with post-war correspondence, I have finally decided to get into print. John, as you probably know, was formerly with Formica of Cincinnati and is now manufacturing Polaroid on a basis he developed himself. He is apparently doing quite well, and one of these days when I get to that part of Ohio, I will drop in on him and let you know more about his situation.

I might outline a few of my own activities during the war as a stimulus to get some of the rest of you to come in and tell us what you have been doing, all of which should prove of considerable interest to the rest of the boys. Since the beginning of 1946, I have been in Washington as assistant director of the rubber division of the Civilian Production Administration in charge of technical operations. This job carries the responsibility of directing the industry's reconversion from synthetic to natural rubber during the postwar period and is a very busy spot indeed, inasmuch as the war is far from over on rubber. The work has been very interesting, and the Washington scene has brought me in contact with a few of our classmates who have been in Washington for one reason or another. Curt McCune is now purchasing agent for the Hercules Powder Company of Wilmington, Del., and dropped in one day on a rubber problem. He is still looking well and doing very well, as you can imagine — married and settled down. I found that he hadn't run into Dick Boyer, who is also in Wilmington with the film division of the Du Pont Company. My encounter with Dick was the result of his stepping into a taxicab with me at the railroad station in Wilmington about two years ago. I also ran into Fred Celler one night in the Hotel Statler here in Washington. Fred is now a commander in the Navy. You will all remember that Fred has always been interested in aeronautics. At the time I saw him, he had not decided whether he would stay in the Navy or not.

Another time, in Hogate's Restaurant, I ran into Colonel Esposito, whom many of you may remember as being in Course II with us. I have had several visits from Hank Gibbons, who has been in Washington on Vought Aircraft business with the Navy Department. Vought, as you recall, developed the Corsair airplane for the Navy and has recently announced the Pancake type of plane. Hank is in charge of one of their major engineering divisions and quite often finds his way into Washington. He is living in Stratford, Conn., and works at the Chance-Vought plant. On one or two occasions I have stopped in to see him when going to New England. So much for my contacts.

Before coming to Washington, I had a few months in Akron with Goodyear, after having spent eight months overseas with the Ordnance Department as civilian consultant in uniform on rubber matters. The primary object of the assignment with the Ordnance Department was to investigate the rubber producing plants and the rubber goods manufacturing facilities in Germany as soon as they were captured. This involved many interesting experiences living in European cities during and after the cessation of hostilities and meant following up the Armies very closely to inspect the captured plants before their facilities could be destroyed by displaced persons or otherwise. From these investigations, much significant material was obtained which proved beyond a doubt the relative qualities of German synthetic rubber and of German products manufactured from synthetic rubber as compared with those made here in the United States. The period with the Ordnance Department was on the basis of being on loan from Goodyear, as is the present status with the C.P.A. With these temporary leaves, my service with Goodyear now aggregates a total of more than 17 years. I have been married approximately the same length of time and now have a daughter eight and one-half years old, who will probably never follow in her father's footsteps at the Institute.

That's about all from me, except that I am a little more bald and a little heavier. How about you all? Come on, boys, let's get the Class of 1929 notes back to normal, and let us hear all about your experiences in industry or in the Army, Navy, and Air Forces during the war. — EARL W. GLEN, *General Secretary*, 407 Fairfax Road, Bethesda, Md. FISHER HILLS, *Assistant Secretary*, Dewey and Almy Chemical Company, 62 Whittemore Avenue, Cambridge 40, Mass.

1931

A number of '31 men have made news during the past few months through their publications or speeches. J. W. Perry has written a series of papers in the *Journal of Chemical Education* under the general title "Chemical Russian, Self-Taught." These papers are written to assist English-speaking chemists who are interested in learning to read chemical Russian. The series began in 1944, but was delayed because of Mr. Perry's participation in war work while at the ballistic research laboratory at Aberdeen Proving Ground, Maryland. — Norman D. FitsGerald spoke on "The Role of Economic Thinking in the Petroleum Business," before the student section

of the American Institute of Mining and Metallurgical Engineers at the University of Texas in Austin. Norman is an independent oil operator and consultant with headquarters in Abilene, Texas. I recall Norman's being present at our 10th reunion, but at that time he was located in New York City, and I suppose the distance from Abilene to Saybrook was just too much for him on the 15th. — Philip W. Bourne spoke at the Hotel Kimball in Springfield before the Western Massachusetts Women's Club on the present-day acute housing problem. Philip is regional project planner of the Federal Public Housing Authority of Boston, and since graduation has been active in city planning and housing problems. In 1935, after graduate work at Harvard and in Europe, he was appointed an architectural engineer in Washington for the United States Public Housing Authority, which led to supervising low-rent housing projects on the West Coast, in Honolulu, and in Boston, as well as F.P.H.A. housing for wartime industries and the Army and Navy.

Legion of Merit awards were presented to Fred Ritchie and Francis Crotty. Frederick A. Ritchie, of 114 Clinton Street, New Bedford, a Vice-president of the National Shawmut Bank of Boston, was a lieutenant colonel and executive officer of the Boston Ordnance District. Before the war Fred, who was admitted to the Massachusetts bar in 1938, was trust officer of the Merchants National Bank of New Bedford. He was elected a vice-president of the National Shawmut Bank in December of 1945. — Francis C. Crotty, a lieutenant colonel, was awarded the Legion of Merit because he "distinguished himself as chief, training division, and as director of industrial relations, Watertown Arsenal, from October, 1940, to August, 1945." After his Technology course, Francis attended the graduate schools of Harvard and Tufts. Before his entry into service he was on the staff of the Somerville school department.

Wilfred V. Jones has recently returned from Bolivia, where since March, 1946, he has been serving our State Department as a technical specialist advising the Bolivian Government in setting up a national employment service. On May 21, he climbed Mount Choroloke, which is 18,377 feet high. Now that's really getting up in the world.

Business notes from here and there: L. W. Johnston, who is with the Nassau Smelting and Refining Company, Tottenville, Staten Island, N.Y., has recently been given an additional job as chief chemist so that he is now functioning in the dual capacity of chief inspector and chief chemist. Arthur A. Smith, who is with the E. B. Badger and Sons Company of Boston as a traveling construction engineer and auditor, has become a member at the Boston chapter of the National Association of Cost Accountants. — John Lyon Reid has announced his association with Sidney F. Bamberger under the firm name of Bamberger and Reid at 110 Market Street, San Francisco 11, Calif., for the practice of architecture and structural engineering. — Alger S. Bourn was appointed as teacher of mathematics in the Franklin, N.H., schools. Alger has spent nine years teaching at the Rumford and Westminster

schools in Connecticut before this recent appointment. — James L. Bryant, manager of fabric development for the cotton and rayon division of Pacific Mills, has resigned as of July 31. — Dr. Samuel Bluhm of Camden, Maine, has joined the Veterans Administration medical staff and been assigned to duty with the medical hospital at the V.A. center, Togus, Maine. Dr. Bluhm attended the Tufts medical school after leaving Technology and received his M.D. in 1934. — John Ness of Lewiston, Maine, is now with the Central Maine Power Company at Bucksport as a power and lighting engineer. Ness was in the Navy during the war and was discharged in November, 1945, with the rank of lieutenant commander.

The following items relate to the activities of 1931 men of the Department of Building Engineering and Construction: Charles S. Camplan of Waale-Camplan Company, 2100 Southwest Jefferson Street, Portland, Ore., several years before the war formed a partnership and since then has constructed many commercial and wartime projects throughout the states of Oregon, Washington, and California. Vincent F. J. Damiano of 2001 Coyle Street, Brooklyn, is chief engineer and chief inspector of construction at the United States Naval Air Station (Floyd Bennett Field), Brooklyn, N.Y. (Public Works Department). He is married and has one child. J. Harold Genrich of 19 Harper Road, Snyder, N.Y., is president of Genrich Builders, Inc., at 4287 Main Street, Snyder. He is married and has four children. Edward H. Goodman of Williamstown, Mass., is at present head of the factory planning and equipment department of the Sprague Electric Company, North Adams, Mass. He is married and has one child.

Thomas E. Harding of 251 Williston Way, Pawtucket, R.I., since 1933 has been city engineer at Pawtucket. He is married and has two boys. Enio O. Persion of 9902 Sutherland Road, Silver Springs, Md., is with the Standard Engineering Company at 2129 Eye Street, Northwest, Washington, D.C., and is now superintendent in charge of mechanical work, plumbing, heating, and air conditioning on construction of a new \$5,000,000 Army building. He is married and has two daughters, Marjorie, aged eight, and Barbara Ann, aged four. He says: "For those who do not know, the missus is the sister of Les Reed's wife, but I snagged mine first, so Les is a copycat!" Leslie H. Reed of 24 Franklin Street, Greenfield, Mass., is assistant treasurer of George H. Reed and Company, Inc., at 24 Franklin Street, Greenfield, Mass. He is married and has one daughter. Tinsley W. Rucker, 3d, of 3940 Napanee Road, Louisville, Ky., is president of the Technology Club of Louisville and vice-president and director of the General Plywood Corporation at 3131 West Market Street, Louisville, Ky. He is married and has one child. F. David Schweizer of Locust Hill, West Charlton, N.Y., has been in the Navy for the past two and one-half years and is now a lieutenant in the Naval Reserve attached to the Navy lumber co-ordinator. He expected to return to civilian life in January, 1946. He is married and has two sons, seven, and nine years old. — BENJAMIN W. STEVERMAN, *General Secretary*, 11 Orient Street, Winchester, Mass.

1932

This month we have quite a bit of news for you, although there are no letters directly from you fellows. If you agree with me that they make the most interesting news, how about doing your share? As mentioned last month, we should like to hear from you as to what should be done for our 15th reunion in June.

Frank R. Cook, an Army colonel, whose home is in Denver, Colo., has recently assumed command of the 308th Bombardment Wing, headquarters for all occupational air forces in Korea. Colonel Cook was in charge of the development and the experimental bomb branch at the time the B-29 was in its infancy. It was his job to expedite the arrival of B-29's on all corners of the globe, thus ending the war months sooner. He was the plane commander on the first B-29 delivered to the field of combat. We have been informed that Robert Grey Cunningham is an electrical inspector for the government at the Fore River shipyard. Myron L. Williams, a lieutenant colonel, is now assigned to the communications and electronics section of Army Ground Force Board No. 1, at Fort Bragg, North Carolina. He was awarded the Bronze Star medal in January, 1945, for meritorious services in support of combat operations from August, 1943, to September, 1944, in Sicily and Italy.

Fred Henderson has been appointed veterans' counselor at Northeastern University for the 1,500 day college veterans. He was head of industrial engineering at Northeastern in 1942 and was engaged in military service for more than two years. Elmer H. Storz has been appointed professor of biochemistry and chairman of the department of biochemistry in the University of Rochester school of medicine and dentistry.

Professor Locke '96 tells us that James Demas and Mrs. Demas announced the arrival of a son, Raymond Joseph, on October 12. John Kimble's new address is 74 Manhattan Street, Rochester 7, N.Y., as he has moved from Solomons, Md., and is apparently out of the Navy. — CLARENCE M. CHASE, JR., *General Secretary*, 1207 West 7th Street, Plainfield, N.J. *Assistant Secretaries*: CARROLL L. WILSON, National Research Corporation, 100 Brookline Street, Boston 15, Mass.; WILLIAM A. KIRKPATRICK, Allied Paper Mills, Kalamazoo, Mich.

1933

On October 3 the newspapers reported the return of E. C. Peterson, an Army captain, after three years in the Pacific. He is taking up his duties as general manager of Middleboro, Mass. A clipping from the *Standard Times* of New Bedford on October 20 tells us of the marriage of Roger Congdon to Miss Leila Sage on October 8 in Denver. They plan to make their home at 26 President Avenue, Providence, R.I.

A recent note from Bob Smith in Rochester reads in part as follows: "What has happened of such earth-shaking import as to bring forth this letter? Well, I think it's newsworthy that I have just altered the course of my business journey for the first time since graduation. As you may have learned from better correspondents than I, I went to work for the Defender Photo Supply Company in Rochester in June, 1933.

After beginning in the research lab, I moved to production as emulsion department superintendent in 1936. In May, 1945, we were absorbed by the Du Pont Company and became the Defender Division, photo production department. Among the giant corporations of the country, that is perhaps the finest to work for, as hundreds of M.I.T. Alumni will testify. I stayed on for one year, meanwhile receiving a promotion to the post of production superintendent of the plant. I have now resigned from Du Pont and organized my own tiny enterprise for the manufacture of chemical specialties, calling it the Quad Company.

"I did not start from scratch but bought out a small business here in town with an established customer list and small physical plant. I am now making (1) Klorodyne, a household bleach, (2) Saf-T-Kleener, a petroleum base dry cleaning fluid, and (3) Windo-Kleen, a waterless cleaner for glass surfaces. Two new products in the household chemical specialties field are in the development stage. It was quite a jump! Last week I was supervising 450 people making several million dollars' worth of photographic papers yearly. This week I am stoking the fire, sweeping the floor, driving the truck, selling, keeping the books of account, and supervising one (part-time) employee who helps me make the product. I was married in '34 and now have two daughters and a son ranging from four to eleven years of age. So the Quad Company has to prosper — or else.

"That's about it for now as far as my story is concerned. I do have a bit of news about Clare Farr, XVI. Clare also resigned from Du Pont, only a month or two before I did. He had been with the engineering department in Wilmington for several years. The last time I talked with him he wasn't sure what next except that he knew he would be moving back to New Hampshire to live."

After receiving the above from Bob, I heard from Clare Farr as follows: "I left Du Pont after 10 years to return to 'dear old New England,' where I am now assistant chief engineer at Dewey and Almy Chemical Company in Cambridge. My home address is Francetown, N.H., until about February 1, after which it will be Hopkinton, Mass." — GEORGE HENNING, JR., *General Secretary*, Belmont Smelting and Refining Works, 330 Belmont Avenue, Brooklyn 7, N.Y. ROBERT M. KIMBALL, *Assistant Secretary*, Room 3-208, M.I.T., Cambridge 39, Mass.

1934

Frank Baxter proudly passed out the cigars a short time back. This time it was for Christie Isabel Baxter, born on October 4 in Gardner, Mass. Congratulations, Frank.

Yau Too Chiu, II, whose address is Industrial Rehabilitation Division, C.N.R.R.A., Kwang-Tung Regional Office, No. 1, Fook Hing Road, Shameen, Canton, China, writes that at the present time there are four M.I.T. men in Canton and, although all four have close contacts, they are too small a body to have any formal social meetings. Before the war there were 18 Alumni in Canton, but one or two died during the war, while most of the others are now working elsewhere. Yau Too Chiu went to Kiang-Si Province during the war to design, erect, and operate a blast furnace

with a capacity of 20 tons a day. After producing about 1,000 tons of pig iron they were forced to evacuate, as the Japanese had pushed very close to the factory. From there he was transferred to be in charge of a machine works which produced about 50 lathes and some 20 other machines, such as planers, drills, shapers, milling machines, and so forth. This machine works' main line of business was in the field of production and repair to meet the war and local needs. This business closed up about six months ago because of lack of orders, and then he returned to Canton to attend to family affairs. In Canton he was asked to join the Industrial Rehabilitation Division of the C.N.R.R.A. Kwang-Tung Regional Office. The equipment supplied to this division has been all war surplus, consisting mainly of generators, and general machinery repairing equipment.

Carlton B. Davis of the Naval Research Laboratory, Navy Department, has been presented the Meritorious Civilian Service Award for outstanding service to the Navy. It consists of a lapel emblem and a certificate of Meritorious Civilian Service, and cites Mr. Davis' service as follows: "For outstanding service in guiding engineers engaged in improving Loran and communications transmitters, facsimile and telepicture devices, and portable equipment for amphibious operations." Carleton now lives at 3808 V Street, Northeast, Washington, D.C. He is married to the former Louise Cook of Reading, Mass. He was employed as a production foreman at Raytheon Production Corporation before reporting to the Naval Research Laboratory in Washington.

Henry Humphreys was also given a citation recently. His was for the Legion of Merit. The notice reads as follows: "Major Henry D. Humphreys, Transportation Corps, Army of the United States, as officer-in-charge, marine drafting section and later engineering section, maintenance and contracts branch, Water Division, New York Port of Embarkation, from April, 1942, to January, 1946, displayed exceptional diligence, resourcefulness, and technical skill. He ably solved many problems encountered by the Army in transporting supplies and material to overseas theaters."

Mal Stevens, who was of such able assistance in organizing our fifth reunion, was married recently. His wife was Julia C. Dwight, daughter of Mr. and Mrs. Herbert B. Dwight of Newton, Mass. The wedding took place on September 21. Mal is on the staff at the Institute.

You know, men, it would be awfully nice if some of you would break down occasionally and send in any bits of news about yourselves or our classmates to your Secretary. If we don't get more news, we are going to resort to filling up this column with limericks. — JOHN G. CALLAN, *General Secretary*, 184 Ames Street, Sharon, Mass. ROBERT C. BECKER, *Assistant Secretary*, Chile Exploration Company, Chuquicamata, Chile.

1938

John Doremus, who took his master's degree with us in Electrical Engineering, was married last September to Dorothy Maginnis of Brookline, Mass. John has been instructing at the Institute, but he is now working in Chicago.

Kantilal Shah, whose family has been at Gay Head on the Cape for the summer, came back to the States to join them in October. He is in business in India, and this is his first trip to this country since he was graduated. We have just had some news about Robert Dunn, who served as a pilot in the Chinese Air Force during the war. He returned last summer to take a course of practical training in textile work at the Abbott Machine Shop in Nashua, N.H., and has again gone to China, where he will work with his father, a textile manufacturer.

Gus Wheale is out of the Army now, working for the International Silver Company in Meriden, Conn. He is selling to the hotel and restaurant businesses in the New England territory. Gus is married and has a little boy, Kirk, about two years old.

Ira Lohman, who has been at the Institute for six months, taking a refresher course in electronic work, has moved his family to St. Louis and is working for the Emerson Electric Manufacturing Company. We have heard from Dick Muther. He and his wife arrived in Zürich, Switzerland, in October, and he is now taking graduate studies at the University of Zürich. They are very happy and are looking forward to some good skiing.

Joe Keithley was in Boston recently. Joe has been working for the Massa Laboratories in Cleveland, but is just starting in business for himself as Keithley Instruments, Inc. Joe plans to make electronic laboratory equipment, and his plant will be in Cleveland. Good luck Joe! — DALE F. MORGAN, *General Secretary*, Carbide and Carbon Chemicals Corporations, 30 East 42d Street, New York, N.Y. ALBERT O. WILSON, JR., *Assistant Secretary*, 32 Bertwell Road, Lexington 73, Mass.

1939

Pete Bernays is back on the job sparking the Course V men to the tune of current addresses soon to be followed with a barrelful of news (or so we're anticipating and hoping). At present, after being in the Army, Pete's address shows him to be in Chicago, we suspect at the University. Right?

The only other items to pass this way, from the reliable press clipping bureaus, concern the award of the Legion of Merit to John Hayes Howard, while on duty with the Division of Naval Communications. John joined the Engineering Research Associates, Inc., last May after his release from the Navy.

We learn also that Ames Bliss has recently become engaged to Mrs. Ray Lofton Dudley, Jr. Ames is now at the Institute for Advanced Study in Princeton. And, finally, we take pleasure in reporting the wedding of Charles Washburn and Florence A. Gardner, of Middleboro, Mass., on last September 28. Charlie is now associated with the C. P. Washburn Company of Middleboro and with the Washburn Builders and Supply Company, also of Middleboro. He recently completed five and a half years of active duty with the Navy and holds a lieutenant commander's commission in the Naval Reserve. — STUART PAIGE, *General Secretary*, 701 Mill Plain Road, Fairfield, Conn. ROBERT C. CASSELMAN, *Assistant Secretary*, 271 Cypress Street, Newton Center 59, Mass.

1940

The following news has been received in a letter from Al Gutttag to Tom Creamer: "At long last here is a bit of news. At present I'm quite busy as I work in the Patent Office in the daytime and go to school evenings. With good luck I shall finish law school this summer; and within the next few months a digest of sugar patents that I have prepared over the last year and a half should be published.

"This summer I took a vacation over the Labor Day week end and saw Arnie and Shirley Arch while I was in New York. He is now out of the Army and is working in Niagara Falls as a chemical engineer. Also on this trip I visited Henry Harrison, VIII, in Rochester. He is working for Eastman Kodak and doing very well. He has a lovely wife, Dorothy, and two nice boys; the younger is now about four months old and the older almost three years. His older boy made newspaper headlines when he was 16 months old by accidentally traveling by himself on a train from Kansas City to Chicago.

"Rap is now teaching at the University of California at Berkeley. Before this he was at the National Institute of Public Health at Bethesda. Dick Babish is now working for Vitarama in New York. He also is numbered among the growing list of parents, with the arrival of a boy, James Francis, on April 8. Milt Green writes that he is now out of the Marine Corps. At the time of his letter he was finishing his vacation. He also writes that Conny Schuerch is back at Tech, working for his advanced degree.

"I ran into George Clark several months ago. He works for Potomac Electric Power and has been married for two years. He was in the Pacific area during the war. I also ran into Sam L. Cohen one day a few months ago. He was working for the Navy Department at the time. In the Patent Office I have met Ed Wallace, who is working for the Ulster Knife Company, and Joe Shill, who is now with Westinghouse in Philadelphia.

"I received an announcement of the marriage of Dorothy Ethel Swan to Alfred J. Green on August 24 in Bangor, Maine. Al is working for United States Rubber in Naugatuck, Conn. Several of our classmates have got, or are getting, patents, among them being Al Green, Massimo Baer, Sam Breck (who received several patents before he died), and Leo Rainard. Leo is now at the Institute of Textile Technology in Charlottesville, Va. Massimo Baer was formerly with Cornell Dubilier but now is with Monsanto in Massachusetts."

Nils Rosenberg also wrote Tom the following: "Since I first wrote you, I have made a change and am now associated with a firm manufacturing the Polar Brand of frozen foods, the S. A. Moffett Company. My work is in plant management, and, like you, I am going through a training period.

"We are still crazy about Seattle and Washington. I acquired a sailboat this summer and have had marvelous fun with it. My brother Steven was out here, and we had swell times hiking and fishing together. He is now at Tech. At about Thanksgiving time it will be possible to ski at Mt. Rainier, and it is only three to four hours' drive from my house to excellent skiing.

"I don't know whether you remember Woody Woodward of Course XIII-C and 150-pound-crew fame. He is with the American Mail Line out here, and we see a lot of him and his wife and daughter. There is a group of 1939 fellows at Boeing, but I don't see them except at Technology club meetings, and the latter are usually few and far between. Hal Seykota has left Seattle, I am sorry to report. He went back to his firm's headquarters in Chicago. He had a son recently, and his wife is staying here with the baby. — H. GARRETT WRIGHT, *General Secretary*, Garrett Construction Company, 510 Sherman Avenue, Springfield, Mo. THOMAS F. CREAMER, *Assistant Secretary*, 6 Berkley Road, Scarsdale, N.Y.

1942

In and around Cambridge, I've been running into classmates quite a bit lately. Malcolm McGregor, VI, has been with the Raytheon Manufacturing Company in Waltham, Mass. throughout the war. Quite a number of '42 men are working in the Servomechanisms Laboratory here at M.I.T. Emery St. George, VI-A, was an engineer there until recently, when he transferred to the Dynamic Analysis and Control Lab. George Schwartz worked in the Servo Lab during the war, but has left to work for the Arma Corporation in New York. George is married to the former Carol Swarz of Brookline, Mass. Another man who was at Servo during the war is John Reeves. John is married and has two children. Bill Pease is still with us. Bill is teaching part time in Electrical Engineering in addition to his engineering at the lab. Bill married Marjorie Allen about a year ago. They have one daughter, Barbara Jane. Steve Dodd is another promising young engineer. Steve married Eileen Howard of Stoneham, Mass., in June, 1945. Your Acting Secretary has been dividing his time between the Servo Lab and teaching in the Math Department.

We have another engagement, that of Laura Wolff of Brookline, Mass., to Gideon Hofmann. Mr. and Mrs. Herbert Harvey announce the birth of a daughter, Janise Lynn, on October 29. What keeps this column alive is the news you fellows write in. So sit down some day and let us know what is happening to you. Any and all news is most welcome. — WARREN S. LOUD, *Acting Secretary*, Room 2-272, M.I.T., Cambridge 39, Mass.

1943

It looks as if the entry for this month must be a short one, for my mailbag has either a large, unnoticed hole in it or has not received much mail recently. I wonder which it is? However, I have had the solution to this vexing problem of a source of supply of letters filled full of nothing but printable news suggested to me. Barbara Demarest Smith, Mrs. Curt Smith to us, puts it this way: "For the past two months, each time an issue of The Review arrived, Curt and I raced to the page where news of '43 should be and then soundly cussed out Clint Kemp for not writing. [I am left without a word of defense!] It has just begun to dawn on me that you can't write news if nobody sends you any! And Curt is slow to write, so I'll do it myself." See what I mean, you married men in 1943? Barbara goes on to say: "In June, Curt was

released from the Army. We packed up our household equipment, left it in Baltimore, and came out to Curt's home in Whiting, Ind. We spent the month of July touring in Wisconsin, Minnesota, Michigan, and Canada — such wonderful country, excellent accommodations, and *mirabile dictu*, no automobile trouble! In September, Curt went to work for the Standard Oil Company in their plant here at Whiting. He is working on their new catalytic — or 'cat' as we all say, now that we're old veterans of the oil business — cracker. It's a new unit, and Curt's work has to do with its proper operation. Sorry, I can't be more specific than that; it is really over my head. But I do know that Curt is enjoying his work and says that he is learning a great deal. We are making our home with Curt's family now and are looking forward to February, when we plan to be back in Boston. Curt is going to re-enter (or is it just enter?) the Graduate School at Technology to complete the work for his S.M., so abruptly interrupted by the call to Officer Candidate School in 1943.

"As for others in 1943, we had a letter from Bob Gunther several weeks ago. He is living at home in Forest Hills, studying lithography and working at it. He enclosed a snapshot of his true love, a schooner named *Jean Lafitte*, in which he spent much time this summer. He shared the *Jean* with others in the gang, and Charlie Crocker was one who saw much service behind the mast: 'That's the comfortable way to sail,' he says; but who was before the mast on these trips? Charlie is spending much time in Norfolk, Va., where A. D. Little is doing some work. He sees Bob Gunther often en route to or from Boston. Tales of their meetings make Curt and me quite envious, for the four of us were a regular foursome when Charlie lived in Washington, we in Baltimore, and Bob in New York.

"In June, Curt was an usher at Al Bakker's wedding, to which Howie Heydt also came and ushered. Howie was at that time stationed in Washington, D.C., and was planning to take a real he-man, sleeping-bag, campfire, hunting trip in the Far West when he is discharged. After that, I believe, he is going back to Technology. Oh, I forgot to say that Al married Jacquie Bland of Portsmouth, Va. She went to school at Bouvé in Boston.

"Curt is playing in the Chicago Business Men's Orchestra now. It is a group of business and professional men who have a good time playing together and have achieved a notable success at it. They are giving a concert in Orchestra Hall on November 18."

Our only other letter this month is from Dick Zeamer, who says that since graduation in February, 1943, until a few weeks ago he was in the Army. After Officer Candidate School he was first assigned to the Tank and Automobile Center at Detroit and stayed there for a year or two until he was transferred to Washington and worked on ammunition. On July 8, 1944, he married the former Jean Hellens, whose home is Shrewsbury, Mass. She is a graduate of Wellesley. Dick passed cigars around on May 4, 1945, when a baby girl joined the Zeamer household.

The material that follows was submitted for the December issue but had to be de-

leted by the editors for lack of space. So don't blame me!

Cupid must have a fair stock of those effective arrows, for my list of prospective targets and hits is long. Going through the targets first, we note that Gilbert Gould and Elinor Frances Wilbur have had their engagement announced. They were both recently released from active duty, both having served in the Navy. Violet Shearer, whose home is in Jackson, Minn., and David Crawford have declared their intentions. Dave was recently released from the Signal Corps and hopes to return to Technology for some graduate work. From Melrose, Mass., comes word that Doris Mae Cooper and Warner B. Smith are engaged. Doris is a graduate of Simmons College, and she expects to make Warner toe the line sometime in November. Frank Record's roving days will soon be over, too, when he and Lucille Charron are married in the near future. Lucille hails from Wellesley Hills and is an alumna of both Smith College and M.I.T. From the Dodgers' home town word has come to hand that Mary Jo Freese and Tom Bennett will soon be wed. Mary is pursuing graduate studies at New York University and is a member of the faculty of the John Adams High School in Brooklyn. From a Brookline clipping the engagement of Shirley Helman and Eugene Eisenberg is confirmed.

And what about Cupid's hits? Well, here they are. In May, the former Janice Evelyn Petit and Rodney Smith were married in Cambridge, Mass. The Smiths are making their home in Belmont. On May 31, the Jacob van Dyke were married in St. Louis. Mrs. van Dyke, the former Margaret Day, was graduated in 1942 from Bennett Junior College, Millbrook, N.Y., and for the present she and her husband will make their home in St. Louis. Our blushing June bride was the former Marguerite Taylor Brink of Newton, Mass., who returned from the altar as Mrs. Leo Feuer on June 15. We understand that the Feuers will be at home in Brookline. I have an announcement of the marriage of the former Margaret Christine Hemple and Frank French in Cambridge on July 6. Frank has returned to Technology for graduate work, and he and his wife are living in Cambridge. Anne Pettingell also chose a chemical engineer when she and Charles Satterfield were married in Belmont on July 6. Anne was graduated in 1945 from Wellesley. On the same day, but in New Rochelle, N.Y., Dorothy Dattner and Dick Stern were also married. Dick's bride was graduated from Barnard College in 1945, and they spent their honeymoon on Nantucket. They are living in Forest Hills, Queens, N.Y. In Heidelberg, Germany, Anne Elizabeth Reeder and James C. Broderick made June 29 their special day. Both of them were serving in Germany at that time. Belmont was the scene of the wedding of Elizabeth Reasoner and John Tinlot. They took their vows on August 31 and expect to remain in or near Boston for a while, for John hopes to return to the Graduate School here at Tech.

San Diego was the place and August 24 the time for the wedding of the former Gladys Stella Bula and Jack Tyrrell. So far as I know, this couple plan to make their home on the West Coast. On the 12th of September, in Detroit, Mary Winifred

Sherman became the wife of John Sewell. Home for the Sewells will be Ithaca, N.Y., where John will enter Cornell for some advanced work in the department of physics. Constance MacKay became Mrs. Richard Childerhose on September 21 in East Hartford. This couple expects to live in Somers, Conn., as Dick is still with the United Aircraft Company in East Hartford. In Randolph, Vt., on September 16, Frances Elaine Sherburne and Bill Bright left the altar together. Mrs. Bright was graduated from Simmons College in 1943 and for a while had a post with the American Optical Company, but later joined the WAVES. As Bill has returned to study at the University of Virginia, they will live in Charlottesville. And finally for this month we heard that Carolyn Elizabeth Grow and Don Ross were married on September 14. Dick Childerhose was Don's best man. Don is currently on the wind tunnel staff at Technology. — CLINTON C. KEMP, General Secretary, Barrington Court, 988 Memorial Drive, Cambridge 38, Mass.

1944 (2-44)

Your Secretary has only recently reached civilization after a tour in the European Theater of Operations, and he wishes to offer his apologies to the Class for the failure of the class notes to appear in The Review. In the future and with your help, he will strive to get the class activities into print. Any personal information from members of the Class that the rest of us would be interested in, is what your Secretary is looking for to sustain this column.

At the Institute this term, there are about 120 of the R.O.T.C. men endeavoring to get their respective degrees in one, two or three terms. As you know, we lost our Class Prexy, George Schutte, during the war in Germany. Our Vice-president, Langdon Flowers, will take his place. Other known casualties at this writing are Wallace Mansion, in Germany, Jim McKelvey, aboard a landing ship for tanks in the Pacific, and Jim McClave in naval service in the Pacific.

In the halls of the Institute, I am constantly running into the old boys. Those whom I have seen are as follows: William Abbott, George Barr, Melvin Becker, Roland Benjamin, Seymour Bessen, Richard Bertes (graduate student), Warren Bishop, David Blattner, Frederick Blatz (graduate student), Henry Bowes (graduate, staff), Henry Bourne, William Boyle, Robert Breck, James Buchanan, John Burdakin, Francis Carey, Frank Carroll, Richard Cavicchi, William Clark, Harry Corwin (graduate student), Robert Cummings, John Dawson (graduate student), Fred DeBell, Louis Demarkles, Wallace Dunlap, Lee Eagleton, Kenneth Eberhard, Robert Faurot, Lamar Field (graduate, staff), Robert Fisher, John Floden, John Flynn, Arthur Fuerman (graduate student), John Gardner, Richard Garrard, Henry Gastrich, Herman Harjes, Alfred Hart, David Jealous, Arthur Karol, Martin King, Ralph Lamade, Samuel Lamport, Henry Lawton, Carl Lindemann, Malcolm McFaul, Justin Margolskee (graduate student), Alvin Markus, Jay Martin, Walter Masnik, Ben Mason, Louis Maxson, Mortimer Meyer, Harold Miller, James Neff, Trigg Noyes (graduate student), Tom Momose (graduate student), Albert Openshaw, Robert

Peck, Arthur Peterson, Donald Phillips, Robert Pietsch, Randall Pratt, Bernard Rabinowitz, Vance Raynsford, Courtney Reeves, William Richardson, William Ritchie (graduate, staff), Charles Ritterhoff, Geoffrey Robillard (graduate student), Richard Robinson, Carl Rohrer, Douglass Root, George Rosenblatt, Norman Schulman, Carl Soderberg (graduate, staff), Leland Stanley, John Taft, Alfred Thompson, William Tierney (graduate, staff), Beverley Tucker, Lewis Tyree, Lawrence Varnerin, Richard Wade, Joel Wagman, Dixon Ward, Stanley Warshaw (graduate student), Robert Wood (graduate student), George Woody, and George Ziegler.

Robert Oppenlander has decided to take up business at the Harvard graduate school, as has S. Newton Feldman. Tom Flannery has attended Harvard Law School for a year now but has decided that he will be better off as a businessman and hopes to enter the business school after getting his degree at Technology.

Robert Plachta has decided his true love is Boston, and as a result he is working through the merchandising school at Filene's department store. Max Daggett left this fall to tour the country for a job and will probably wind up in Arkansas. Theodore Loomis has just been graduated and was on his way to his new job when I saw him last. I understand that Chuck Carlson and Ken Nelson are working in New York. Craig Williams, according to latest reports, is cashing in on a civilian job over in Japan. Sten Hammarstrom is believed to have renounced and is supposed to be in Germany.

Many of the boys have taken on added responsibilities, believing two can live as cheaply as one. The last to reach this status is Roger Patterson, who married Janet Johnson at Wellesley Hills on September 28. Arnold Mackintosh was best man. Carol Carter and Stanley LaVallée have

announced their engagement. Walter Jaeger married Janet Atkinson at Noroton, Conn., on September 29. Lorenzo Lamadrid was an usher. William Schlegel married Betty Langheck last month in Chicago, and they are living in Reading, Pa., where Willie has become a vice-president in the Hendel hat factory. The Wallace Dunlaps now have a son, named Wallace Perry, 3d. Wallace married Bobbie Chapin of Wellesley Hills in July of 1944. Hank Bowes, James Buchanan, Charles Carlson, Henry Gastrich, Arthur Karol, Henry Lawton, Jay Martin, Howard Boreham, Randall Pratt, and William Ritchie have also joined the ranks of the married.

Drop your Secretary a note and give him the last word on your doings. — WILLIAM B. SCOTT, *General Secretary*, 333 Beacon Street, Boston, Mass. JAMES E. GALLIVAN, JR., *Assistant Secretary*, 430 Adams Street, Dorchester 22, Mass.

1945 (10-44)

The peace is more than a year old. Yet many of our classmates have evidently not settled down enough to schedule time for writing. I hope they will soon be able to drop me a note about themselves and classmates they have recently met. Fortunately, some news has filtered through the general obscurity.

Stan Pasternak and Nancy Copeland of Emerson were recently seen returning from the Trinity Church altar as man and wife. After a Maine honeymoon, they established a home in Brookline but are now in the Riverside Apartments on Memorial Drive in Cambridge. The wedding of James H. Grimes, Jr., and Marguerite E. Carrell of Regis College helped set a record high of marriages for the month of September in Medford. Mr. and Mrs. Warren J. Harwick announced the expansion of their family circle by the arrival of their daughter, Victoria Ann.

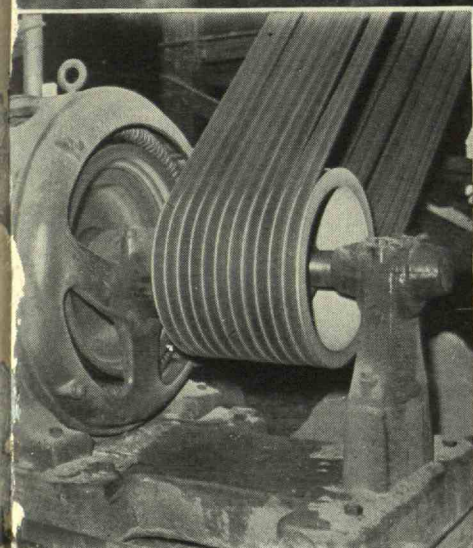
One of this year's *Al Nav's* listed Art Plaut as having been accepted by the regular Navy. Art always wanted the military life. After winning a nationwide scholastic competition for an appointment to Annapolis, he was refused because of faulty eyesight. Upon the Academy's recommendation, he was admitted to the Institute and received his degree with our Class. All who knew him realize what a capable officer the Navy has won.

While in Pennsylvania this October, I spent a week end at Lehigh University with Dick Jorgenson. Within the week he was to receive his B.S. degree in industrial engineering, and then in November was to begin as a salesman for Merrill and Usher of Worcester, metal distributors for the New England area. While seeing the town, we saw many of the Lehigh men who had been at Technology during the war. Among them was Bruno DePaoli, who, though studying at Lehigh, regularly visits the Institute to see old friends.

Here in New York, I lunch once a week with Fred Schierbaum. As a co-founder and executive vice-president of the Crown Compound and Chemical Company, producer of raw plastics, he is well on the way toward making his mark. Fred and his wife, the former Virginia Wait of Washington, D.C., have bought a home in Short Hills, N.J., where they anticipate entertaining all Tech men encountered.

The above consists almost entirely of chitchat about my personal friends. I know many of you would like to read some news about your particular friends. I resolve to print that news as soon as it starts coming in via your letters to me. May good fortune and happiness be yours throughout the year. — JAMES S. MULHOLLAND, JR., *General Secretary*, 1172-77th Street, Brooklyn 28, N.Y. JAMES B. ANGELL, *Assistant Secretary*, M.I.T. Graduate House Cambridge 39, Mass.

ALDEW-PROOF—Flexible—RUGGED



The Rippling Muscles of **MANHATTAN'S**

Homocord **CONVEYOR BELTS** take a terrific pounding and come back for more . . .

and more, and more, until you wonder how any belt can take so much. But it's the Homocord **STRENGTH MEMBER** infused and protected with **FLEXLASTICS** that makes this belt pay so well. Stout cords of chosen quality encased in Flexlastics are engineered to roll with the impact like good boxers—and to rebound to every shock . . . It's an engineered belt from core to cover, designed only for conveying and made only by Manhattan.

Condor V-BELTS
WHIPCORD

on pumps, shaker screens, coal crushers, washers, fans and other equipment run longer, because they are balanced better. 8 important features are embodied in every Condor V-Belt. Available also with Oil-Proof and Non-Spark features. See Bulletin 6868-B.

Conveyor and Elevator Belts
Transmission Belts
V-Belts
Air, Water, Steam Hose
Fire Hose
Dusting Hose
Suction Hose
Oil Spray Hose
Flexible Rubber Pipe

MANHATTAN

Condor
PRODUCTS

for the
Coal Industry

Rubber-Lined Pipe
Chute and Launder Lining
Packing and Tubing
Oilless Bearings
Vibration Dampeners
Mine Trolley Wire Guards
Reel Flanges
Brake Blocks and Lining, Clutch Facings
Molded Mine Specialties



RAYBESTOS-MANHATTAN, INC.

MANHATTAN RUBBER DIVISION

EXECUTIVE OFFICES AND FACTORIES

PASSAIC, NEW JERSEY

Thomas H. Boyd, '23

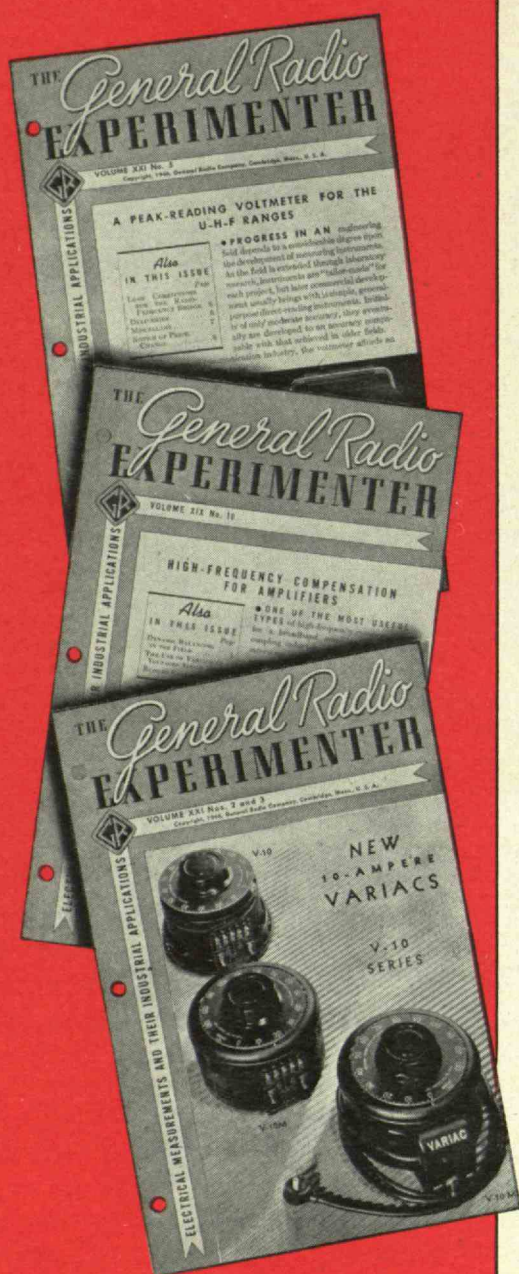
Wilder E. Perkins, '25

Charles P. McHugh, '25

Daniel J. Hanlon, '37

Albert W. Becker, '40

Do YOU Read the G-R EXPERIMENTER?



• The General Radio *Experimenter* is sent WITHOUT CHARGE each month to scientists, engineers, technicians and others interested in communication-frequency measurement and control instruments. It has been published continuously since 1926. Each month it contains eight pages of articles describing new G-R instruments, new ways of using G-R equipment, and numerous applications of a general engineering nature.

Included in recent issues have been articles on such subjects as: peak-reading u-h-f-voltmeter; output systems of signal generators; new VARIACS; multiple photos with the Microflash; measuring lateral motions in a rotating system; new amplifier and null detector; constant waveform frequency meter; series and parallel components of impedance; improved megohmmeter for a-c operation; a light source for microsecond photography, etc.

To be placed on the mailing list to receive the *Experimenter* regularly, merely fill in, clip and mail the coupon below; or supply ALL of the information requested . . . a post card will do.

MAIL NOW! PLEASE FILL IN COMPLETELY

TO: General Radio EXPERIMENTER, 275 Mass. Ave., Cambridge 39, Mass.

Enter my COMPLIMENTARY subscription to the G-R EXPERIMENTER.

Name (print) Company Name

Company Address Street City and Zone No. State

Type of Business Your Title



GENERAL RADIO COMPANY Cambridge 39, Massachusetts

90 West St., New York 6

920 S. Michigan Ave., Chicago 5

950 N. Highland Ave., Los Angeles 38